Ricky Hu

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Highlights

Multidisciplinary background: Passion for medical imaging, rigorous grad school training in **imaging physics**, computer science, electrical engineering, mathematics. 10+ year programming experience.

Research scholar in imaging innovation: 20 publications, 7 first author, 14 in basic sciences inventing new AI and physics algorithms for characterizing ultrasound/CT. 7 conference awards.

Leader in medical education: Founder and **primary instructor** of workshops teaching AI to medical students across Canada for last 4 years, communicating curriculum by publishing in **Nature Communications Medicine.**

Long-term volunteer: 12+ year leader in Scouts Canada, teaching survival camping and leadership to youth, 10+ year sailing instructor, **advocate and inventor** of low-cost voice assist devices for low-resource environments.

Education

MD	Doctor of Medicine, Queen's University (In Progress)	Sep 2019 - May 2023
MASc	Master of Applied Science, University of British Columbia Biomedical Engineering**, Artificial Intelligence and Imaging Physics**	Sep 2017 - Aug 2019
BASc	Bachelor of Applied Science, University of British Columbia **Engineering Physics** (Electrical & Computer Specialization) and Minor in Mathematics	Sep 2011 - Jun 2016

Research - Published Manuscripts

*5 selected papers highlighting innovation, leadership, and relevance to medical imaging

During Medical School:

1.* **Hu R**, Chen I, Peoples J, Salameh J, Gönen M, Romesser PB, Simpson A, Reyngold M. (2022). Radiomics artificial intelligence modelling for prediction of local control for colorectal liver metastases. Physics and Imaging in Radiation Oncology, 24, 36-44. https://doi.org/10.1016/j.phro.2022.09.004

2.* **Hu R**, Singla R, Ringstrom C, Hu Z, Lessoway V, Reid J, Murray T, Nguan C, Rohling RN. (2022). Prediction of Kidney Transplant Function with Machine Learning from Computational Ultrasound Features. Simplifying Medical Ultrasound, 34-43. https://doi.org/10.1007/978-3-031-16902-1_4

3. **Hu R**, Wyss JKM, Mathur P, El-Hariri H, Danaei P, Parhar H, Amanian A, Anderson DW. (2022). A Prototype Low-Cost Pharyngeal Vibration Device for Voice Rehabilitation. IEEE IBIOMED, 13-17. https://doi.org/10.1109/IBIOMED56408.2022.9988665

4.* **Hu R**, Fan K, Pandey P, Hu Z, Yau O, Teng M, Wang P, Li A, Ashraf M, Singla R. (2022) Insights from teaching artificial intelligence to medical students in Canada. Nature Communications Medicine, 2(1), 1-5. https://doi.org/10.1038/s43856-022-00125-4

5. Deeba, F, **Hu R**, Lessoway V, Terry J, Pugash D, Mayer C, Hutcheon J, Salcudean S, Rohling R. (2022). Imaging of Placental Elasticity and Viscosity, 48(12), 2486-2501. Ultrasound in Medicine and Biology. https://doi.org/10.1016/j.ultrasmedbio.2022.08.001

6. Hu Z[1], **Hu R[1]**, Yau O, Teng M, Wang P, Hu G, Singla R. Tempering Expectations on the Medical Artificial Intelligence Revolution (2022). JMIR Medical Informatics, 10(8), e34304. https://doi.org/10.2196/34304
   [1]Co-first authorship, equal contribution. No familial relation despite identical surnames.
7. Singla R, Ringstrom C, **Hu R**, Lessoway V, Reid J, Nguan C, Rohling R. Speckle and Shadows: Ultrasound-specific Physics-based Data Augmentation Applied to Kidney Segmentation. (2022). Medical Imaging with Deep Learning. ePub. https://openreview.net/forum?id=E_KsfOoVf9D
8. Teng M, Singla R, Yau O, Lamoureux D, Gupta A, Hu Z, **Hu R**, Aissiou A, Eaton S, Hamm C, Hu S, Kelly D, MacMillan KM, …, Jarus T, Field TS. (2022). Health Care Students' Perspectives on Artificial Intelligence: Countrywide Survey in Canada. JMIR medical education, 8(1), 33390. https://doi.org/10.2196/33390
9. Pati, S, Baid U, … **Hu R** (latter author), … , Bakas S. (2022). Federated Learning Enables Big Data for Rare Cancer Boundary Detection. Nature Communications, 13. https://doi.org/10.1038/s41467-022-33407-5
10. Liblik K, **Hu R**, Foldes-Busque G, Johri AM. (2022). The FRIDA Pilot Study (Female Risk Factors for Post-Infarction Depression and Anxiety). Canadian Journal of Cardiology, 37(10), S17. https://doi.org/10.1016/j.cjca.2021.07.045
11. 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, 147-156. https://doi.org/10.1007/978-3-030-87735-4_14
12. Deeba F, **Hu R**, Lessoway V, Terry J, Pugash D, Hutcheon JA, Mayer C, Rohling R. (2021) A Quantitative Ultrasound Approach for Detecting Placenta-Mediated Diseases. IEEE International Ultrasonics Symposium (IUS), 1-3. https://doi.org/10.1109/IUS52206.2021.9593634
13. Deeba F, Schneider C, **Hu R**, Lessoway V, Terry J, Pugash D, Hutcheon JA, Mayer C, Rohling R. (2021) Ultrasonic Attenuation Coefficient Estimate of Placenta is correlated to MRI Proton-Density-Fat Fraction. IEEE International Ultrasonics Symposium (IUS), 1-4. https://doi.org/10.1109/IUS52206.2021.9593905
14. Deeba F, **Hu R**, Lessoway V, Terry J, Pugash D, Hutcheon JA, Mayer C, Rohling R. (2021). SWAVE 2.0: A multimodal placental imaging study. Placenta, 112, 17-18. https://doi.org/10.1016/j.placenta.2021.07.059

Before Medical School:
15. Fan K, **Hu R,** Singla R. (2020). Introductory machine learning for medical students: A pilot. Medical Education, 54(11), 1042-1043. https://doi.org/10.1111/medu.14318
16.* **Hu R,** Singla R, Deeba F, Rohling RN. (2019). Acoustic shadow detection: study and statistics of B-Mode and radiofrequency data. Ultrasound in Medicine & Biology, 45(8), 2248-2257. https://doi.org/10.1016/j.ultrasmedbio.2019.04.001
17.* **Hu R,** Singla R, Yan R, Mayer C, & Rohling RN. (2019). Automated placenta segmentation with a convolutional neural network weighted by acoustic shadow detection. IEEE Engineering in Medicine and Biology (EMBC), 6718-6723. https://doi.org/10.1109/EMBC.2019.8857448
18. Deeba F, **Hu R,** Terry J, Pugash D, Hutcheon JA, Mayer C, Salcudean S, Rohling R. (2019). A spatially weighted regularization method for attenuation coefficient estimation. IEEE International Ultrasonics Symposium (IUS), 2023-2026. https://doi.org/10.1109/ULTSYM.2019.8925604
19. Ma M, Murray K, Ye M, Lin S, Wang Y, Lu Z, Yun H, **Hu R,** Jaeger NAF, Chrostowski L. (2016). Silicon photonic polarization receiver with automated stabilization for arbitrary input polarizations. CLEO: Science and Innovations, 4-8. https://doi.org/10.1364/CLEO_SI.2016.STu4G.8
20. Jayatilleka H, Murray K, Guillén-Torres MÁ, Caverley M, **Hu R,** Jaeger NAF, Chrostowski L, Shekhar S. (2015). Wavelength tuning and stabilization of microring filters using silicon in-resonator photoconductive heaters. Optics Express, 23(19), 25084-25097. https://doi.org/10.1364/OE.23.025084

Research - Select Oral and Poster Conference Presentations

Only one conference listed for identical titles accepted to multiple conferences
*Indicates presenting author

1. (Accepted) **Hu R*,** Rizwan A, Hu Z, Li A, Chung A, Kwan B. An Artificial Intelligence Training Workshop for Radiology Residents. (2023). American Roentgen Ray Society Annual Meeting. (Poster).
2. **Hu R***, Singla R, Ringstrom C, Hu Z, Lessoway V, Reid J, Murray T, Nguan C, Rohling RN. (2022). Prediction of Kidney Transplant Function with Machine Learning from Computational Ultrasound Features. Simplifying Medical Ultrasound at Medical Image Computing and Computer Assisted Intervention. (Oral).
3. **Hu R***, Wyss JKM, Mathur P, El-Hariri H, Danaei P, Parhar H, Amanian A, Anderson DW. (2022). A Prototype Low-Cost Vibration Deice for Voice Rehabilitation. International Conference on Biomedical Engineering. (Oral).
    1st place winner of best paper award (out of 100+ papers)
4. **Hu R***, Hu Z, Singla R, Ringstrom C, Hu G, Lessoway V, Reid J, Rohling R, Nguan C, Murray T. (2022). Predicting transplant kidney function from ultrasound using interpretable artificial intelligence. Canadian Association of Radiologists Annual Scientific Meeting. (Oral).
    1st place winner of Radiologist-In-Training Competition
5. Singla R*, Ringstrom C, **Hu R,** Lessoway V, Reid J, Rohling R, Nguan C. Ultrasound Speckle Distributions of Transplanted Kidneys. (2022) UBC Urology Lorne D. Sullivan Research Day. (Oral).
6. Hu Z**, Hu R***, Yan R, Mayer C, Rohling R, Singla R. Automated Placental Disease Prediction in Ultrasound with Neural Networks. (2021). UBC Tri-Cluster Research Day. (Poster).
    1st Place Winner of People's Choice Top Poster Award
7. Hu Z*, **Hu R**, Singla R, Yan R, Rohling RN, Mayer C. (2021). AI-based risk stratification of placental disease from ultrasound with a convolutional neural network. UBC Radiology Research Day. (Oral + Poster).
8**.** Hu Z**, Hu R***, Yan R, Mayer C, Rohling R, Singla R. Automatic Placenta Abnormality Detection using Neural Networks on Ultrasound Texture. (2021) Perinatal, Preterm and Paediatric Image Analysis (Poster).
9. **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).
    Winner of Dr. Albert Clark Award for Excellence in Research
10. **Hu R***, Singla R, Yan R, Mayer C, & Rohling RN. (2019). Automated placenta segmentation with a convolutional neural network weighted by acoustic shadow detection. IEEE Engineering in Medicine and Biology Society Annual Conference. (Oral). (Also published as full length paper in associated journal).
11.. **Hu R***, Mathur P, El-Hariri H, Wyss J, Danaei P, Parhar H, Prisman E, Anderson DW. (2018). A low-cost variable frequency device to assist speech generation post-laryngectomy. UBC Surgery Research Day. (Oral).
    Winner of Top Plenary Award

Teaching Experience

1. Lead Instructor - AI for Medical Students Workshop   Mar 2019 – Present
Taught AI workshop to 300+ medical students over 4 years, designed lectures with custom AI programming examples. Published in Nature Communications Medicine, approved for transcript credits at Queen's.

2. Medical Imaging Physics Teaching Assistant - UBC   Sep 2018 – Dec 2018
Instructed tutorials and graded assignments/exams in topics of X-ray, CT, MRI, and ultrasound imaging physics.

3. Computer Science and Statistics Consultant / Tutor - Independent   Sep 2015 – Present
Programmed tutorials for custom statistics analysis for medical students to conduct their research projects. Taught mathematics and programming to junior engineering students.

Extracurricular Leadership and Volunteering Activities

1. Founder and Technical Lead (150+ hours) - AI for Medical Students Initiative   Sep 2020 - Present
Founded Queen's chapter in national AI in Medicine Student Society. Led initiative to teach AI (https://ubcaimed.github.io/aboutus.html). Communicated strengths/limitations of AI on invited panels.

2. Robotics Fabrication and 3D Printing (700+ hours) - Independent   Oct 2015 - Present
Collaborated in teams of 1-5 to invent low-cost medical devices. Example: built post-laryngectomy voice-assist device at $1/10^{th}$ of commercial price, presented in Asia to share design for free to advocate for under-served patients.

3. Senior Scout Leader (3000+ hours) - 3rd Richmond Scout Troop   Sep 2010 - Present
Led programs to train 300+ scouts aged 5-20 in outdoor survival, leadership, and communication. Led 150+ workshops, 30+ camping trips. Advocate of youth programs, organizing 17+ fundraisers, raising $40,000+.

4. Water Rescue Lead and Sailing Instructor (900+ hours) - Scouts Canada   Jun 2010 - Present
Co-led volunteer-run nonprofit sailing program with team of 6 rescuers to pilot watercraft, teach sailing, and aid sailors in distress during summers. Responsible for 200+ students over the last 12 years.

5. Senior Executive (30 hours) - Queen's Innovation in Medicine Interest Group   Aug 2020 - Aug 2021
Organized seminars and workshops for medical students to learn and engage with physician-innovators.

6. Business Development Partner (100 hours) - Entrepreneurship @ UBC   Sep 2018 - Oct 2019
Volunteered in team of 2 to develop business models for a startup developing flexible ultrasound devices. Communicated to physicians and investors to highlight medical, engineering, and economic value.

Activities Discontinued Prior to Medical School
Executive, UBC Biomedical Engineering Graduate Association   Sep 2017 - May 2019
Project Advisor, UBC Biomedical Engineering Student Team   Sep 2017 - Sep 2018
Webmaster, UBC Engineering Undergraduate Society   Sep 2013 - May 2015

Select Work Experience

1. Graduate Research Assistant - UBC Robotics and Control Laboratory   Aug 2017 - Aug 2019
Programmed AI algorithms and aided in building elastography devices to characterize abnormal tissue in placenta. Took ownership of, designed, led and completed 3 clinical studies, published 8 manuscripts.

2. Software Engineer - MDA Systems Ltd.   Aug 2016 - Apr 2017
Developed algorithms and software for image processing and geodetic mapping for imagery data such as for Google Earth, weather prediction, and military partners. Some of my code is on satellites in space!

3. Data Science Engineer - Pacific Institute of Mathematical Sciences   May 2016 - Aug 2016
Programmed 15 prototypes to showcase python analytics, such as object recognition from user-input images.

4. Software Development Intern - Spot Solutions Ltd   May 2014 - Dec 2014
Programmed web applications (C# and SQL) for 8+ business clients in teams of 1-5 on projects worth $200,000+.

Select Academic Awards

1. Canadian Association of Radiologists Radiologist-In-Training Top Oral Award   2022
   Awarded for top oral presentation at 2022 CAR Annual Scientific Meeting (1st author)
2. Canada Diagnostic Centre Best Poster Award   2022
   Awarded for top student abstract (1st author)
3. IEEE International Biomedical Engineering Conference Best Paper Award   2022
   1st out of 100+ papers at IEEE-affiliated conference for low-cost electrolarynx device invention
4. Resident Doctors of British Columbia Innovation Grant ($5000)   2022
   Research funding as lead engineer in developing low-cost laryngectomy phonation device
5. Queen's Radiology Research Grant ($5500)   2022
   Research funding for leading, surveying, and teaching AI training workshop for residents
6. Image Guided Therapeutics and Diagnostics Symposium Top Abstract Award   2021
   Top biomedical engineering abstract in the 2021 IGTD symposium
7. Queen's University Basmajian Research Scholarship ($5000)   2021
   Research funding as lead engineer in developing artificial intelligence in CT imaging
8. Queen's School of Medicine Dr. Albert Clark Research Award   2020
   1 of 3 top project awards across all 4 years for 2020 Queen's School of Medicine Research Day
9. UBC Biomedical Engineering Symposium Best Poster Award   2018
   Best poster award for development of automated placental segmentation algorithm
10. UBC Faculty of Applied Science Graduate Student Award ($2000)   2018
   For academic standing, research (highest grade in multiple classes and conference awards), and mentorship

Select Non-Academic Awards

1. Queen's Aesculapian Society Golden Stethoscope Award   2020
   Peer-nominated award given for producing comedic but relevant study material for peers
2. Scouts Canada Certificate of Commendation   2019
   "For service to Scouting worthy of commendation", totaling 3000+ hours and ongoing
3. Duke of Edinburgh's Award – Gold Level   2017
   For exemplary community service, athletics, adventure, and skill development

4. Scouts Canada Bar to the Medal of Good Service   2017
  For recognition of mastery (1000+ hours) of outdoor skills reciprocating in service to train new scouts
5. Scouts Canada Medal of the Maple   2013
  Provincially nominated for "community service, extraordinary participation and personal values."
6. Queen's Venturer Award   2010
  For 1000+ hours in achieving competency in outdoor survival, watercraft, and leadership skills

Interests

Competitive College Trivia Player

I am on the Queen's (previously UBC) Quizbowl Team for last 6 years in collegiate league against Canada/American universities. I hope to organize local trivia leagues and audition for Jeopardy in the future!

Puzzle Collecting

I collect mechanical puzzles (Rubik's Cubes, 3D mazes). My current favourite is the "Iwasawa Square in the Bag".

Sailing and Survival Camping

2-3 times a year our group of adventurists camp in snowy mountains or sail to isolated islands in the Strait of Georgia.

Recreational Sports / Hockey Fanatic

I play in local table tennis, dodgeball, ball hockey leagues. I attend 1 hockey game a year (**home team lost each time**).

Piano and Guitar   Sep 2005 - Present

Achieved RCM Grade 8 Piano certification and Grade 3 in Harmony. Self-taught guitar from interest and to teach songs to scouts. Currently teaching sea shanties, - great way to boost morale on long hikes!

Languages

English:	Fluent	French:	Basic proficiency
Cantonese:	Fluent	Mandarin:	Basic proficiency
Programming:	Professional experience in C, C++, Python, MATLAB, Java, SQL, Bash, LaTeX, Git		