Ricky Hu

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Highlights

20 publications, 7 first author, 14 in basic sciences/engineering programming AI and physics algorithms for image analysis, winning 7 multiple national/international conference top awards

Multidisciplinary collaborator in leading clinical studies with radiology, urology, pathology, cardiology, otolaryngology, engineering, and providing statistical analysis for peer medical students

National leader in AI technical expertise, teaching medical students across Canada and publishing custom curricula in Nature Communications Medicine

Leader in addressing health inequities by solution-building and inventing low-cost medical devices for low-resource regions

Long-term 10+ year volunteer in Scouts Canada teaching youth survival camping, sailing, and leadership skills

Education

MD Doctor of Medicine, Queen's University (Class of 2023) Sep 2019 - May 2023

MASc Master of Applied Science, UBC Sep 2017 - Aug 2019
Biomedical Engineering, AI and Imaging Physics (Thesis Grade: 95%)

BASc Bachelor of Applied Science, UBC Sep 2011 - Jun 2016
Engineering Physics (Electrical & Computer Specialization) and Minor in Mathematics

All Full-Length Published Manuscripts:

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 treated with radiotherapy. 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. 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 Following Laryngectomy. IEEE IBIOMED. In Press.
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). SWAVE 2.0 Imaging of Placental Elasticity and Viscosity: Potential Biomarkers for Placenta-Mediated Disease Detection. Ultrasound in Medicine and Biology, in Press. https://doi.org/10.1016/j.ultrasmedbio.2022.08.001
6. Hu Z*, **Hu R***, Yau O, Teng M, Wang P, Hu G, Singla R. Tempering Expectations on the Medical Artificial Intelligence Revolution: The Medical Trainee Viewpoint. (2022). JMIR Medical Informatics, 10(8), e34304. https://doi.org/10.2196/34304

*__Equal contribution and co-first authorship. No familial relation.__

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 Imagine 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, Malik S, Mazoli V, Teng Y, Laricheva M, Jarus T, Field TS. (2022). Health Care Students' Perspectives on Artificial Intelligence: Countrywide Survey in Canada. JMIR medical education, 8(1), e33390. https://doi.org/10.2196/33390
9. (Accepted) Pati, S, Baid U, Edwards B, Sheller M, Wang S, Reina AR, … **Hu R** (latter author), … Barnholtz-Sloan JS, Martin J, Bakas S. (2022). Federated Learning Enables Big Data for Rare Cancer Boundary Detection. Nature Communications. In Press.
10. Liblik K, **Hu R,** Gomes Z, Foldes-Busque G, Mensour E, Sedlak T, Mulvagh SL, Johri AM. (2022) Female risk factors for post-myocardial infarction depression and anxiety (FRIDA): Pilot results. General Hospital Psychiatry. ePub. https://doi.org/10.1016/j.genhosppsych.2022.05.005
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: A Preliminary Ex Vivo Study. 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). Project SWAVE 2.0: A multimodal placental imaging study. Placenta, 112, E17-E18. https://doi.org/10.1016/j.placenta.2021.07.059
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

Peer-Reviewed Conference Oral and Poster 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. Workshop of Advances in Simplifying Medical Ultrasound at the 2022 International Conference on Medical Image Computer 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 Pharyngeal Vibration Device for Voice Rehabilitation Following Laryngectomy. 2022 International Conference on Biomedical Engineering. (Oral).
   1st place winner of best paper award (out of 200+papers)
4. **Hu R*,** Hu Z, Singla R, Ringstrom C, Hu G, Lessoway V, Reid J, Rohlinh R, Nguan C, Murray T. (2022). Predicting transplant kidney function decline from ultrasound only using an interpretable artificial intelligence model. Canadian Association of Radiologists Annual Scientific Meeting. Virtual. Also presented at UBC Radiology Research Day. (Oral + Poster).
   1st place winner of Radiologist-In-Training Competition (CAR ASM 2022)
   1st place winner of Canada Diagnostic Poster Contest (UBC Radiology Research Day)
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) Automated AI-based risk stratification of placental disease from ultrasound imaging with a convolutional neural network system. UBC Radiology Research Day. (Oral + Poster).
   1st place winner of Canadian Diagnostic Poster Contest
8. Hu Z**, Hu R***, Yan R, Mayer C, Rohling R, Singla R. Automatic Placenta Abnormality Detection using Convolutional Neural Networks on Ultrasound Texture. (2021) Perinatal, Preterm and Paediatric Image Analysis at Medical Image Computer and Computer Assisted Intervention. (Poster).
9. 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. (Poster).
10. **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
11. **Hu R*,** Mathur P, El-Hariri H, Wyss J, Danaei P, Parhar H, Prisman E, Anderson DW. (2018) A low-cost variable frequency vibration device to assist speech generation for laryngectomy patients. UBC Department of Surgery Research Day, Oral Presentation. (Oral)**.**
    Winner of Top Plenary Award

Academic Teaching Experience

Co-Founder and Lead Instructor - AI for Medical Students Workshop Jan 2019 – Present
Founded and taught AI workshop (running 4 times, ongoing) to 300+ virtual and 60+ live medical students, designed lectures on AI concepts and custom AI programming examples. Published in Nature Communications Medicine and approved for Academic Enrichment Program credits at Queen's.

Medical Imaging Physics Teaching Assistant - UBC 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.

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.

Select Academic Awards

IEEE International Biomedical Engineering Conference Best Paper Award 2022
1st out of 200+ papers at IEEE-affiliated conference for low-cost electrolarynx device invention

Canada Diagnostic Centre Best Poster Award 2022
Awarded for top student abstract at 2022 UBC Radiology Research Day (1st author)

Canadian Association of Radiologists Radiologist-In-Training Top Oral Award 2022
Awarded for top oral presentation at 2022 CAR Annual Scientific Meeting (1st author)

Resident Doctors of British Columbia Innovation Grant ($5000) 2022
Research funding as lead engineer in developing low-cost laryngectomy phonation device

Queen's Radiology Research Grant 2022
Research funding for leading, surveying, and teaching AI training workshop for residents

Image Guided Therapeutics and Diagnostics Symposium Top Abstract Award 2021
Top biomedical engineering abstract in the 2021 IGTD symposium

Canada Diagnostic Centre Best Poster Award 2021
Awarded for top student abstract at 2021 UBC Radiology Research Day (2nd author)

Queen's University Basmajian Research Scholarship 2021
Research funding for lead engineer in developing artificial intelligence in CT imaging

Queen's School of Medicine Dr. Albert Clark Research Award 2020
1 of 3 top project awards for 2020 Queen's School of Medicine Research Day

UBC Chung Surgery Research Day Top Plenary Talk Award 2018
1 of 3 top plenary talk awards for invention of low-cost electrolarynx device

UBC Biomedical Engineering Symposium Best Poster Award 2018
Best poster award for development of automated placental segmentation algorithm

UBC Faculty of Applied Science Graduate Student Award 2018
Awarded for academic, research, and community service excellence

UBC School of Biomedical Engineering Graduate Student Initiative Award 2018
Awarded for academic and research excellence

Non-Academic Awards

Queen's Aesculapian Society Golden Stethoscope Award 2020
Peer-nominated award given for producing comedic but relevant study material for peers

Scouts Canada Certificate of Commendation 2017, 2018, 2019
For "For service to Scouting worthy of commendation", totaling 3000+ hours

Duke of Edinburgh's Award – Gold Level 2017
For exemplary community service, athletics, adventure, and skill development

Scouts Canada Bar to the Medal of Good Service 2017
For long-term service to Scouts Canada in training youth in outdoor skills and teaching

Scouts Canada Medal of the Maple 2013
Provincially nominated for "community service, extraordinary participation and personal values."

Queen's Venturer Award 2010
For 1000+ hours in achieving competency in outdoor survival, watercraft, and leadership skills

Work Experience

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. Designed and led 2 clinical studies, published 8 manuscripts.

Software Engineer - MDA Systems Ltd. Aug 2016 – April 2017
Developed algorithms and software for image processing, geodetic mapping, and earth ellipsoid modelling from satellite imagery data for applications such as weather prediction and Google Earth.

Data Science Engineer - Pacific Institute of Mathematical Sciences 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.

Research Assistant - UBC Photonics Research Group 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.

Software Development Intern - Spot Solutions Ltd 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.

Mechanical Engineering Intern - NORAM Engineering and Constructors Jan 2013 – Apr 2013
Planned, executed, and analyzed chemical yield experiments, utilizing MATLAB signal processing algorithms to filter chemical reactor thermal data.

Extracurricular Leadership and Volunteering Activities

School Representative / AI Consultant - AI in Medicine Student Society Sep 2020 - Present
Represented Queen's School of Medicine in Canadian AI student society. As the AI engineering content expert, provided technical insight on curriculum development, grant writing, and event organization.

Senior Executive - Queen's Innovation in Medicine Interest Group Aug 2020 - Aug 2021
Organized seminars, networking events, and workshops for medical students to learn about novel medical technologies and engage with physician-innovators.

Startup Co-Venturer - Entrepreneurship @ UBC Sep 2018 - Oct 2019
Volunteered in team of 2 to develop business models for a startup developing flexible ultrasound devices. Presented to physicians and investors to highlight medical, engineering, and economic value.

Senior Scout Leader - 3rd Richmond Scout Troop Sep 2010 - Present
Develop programs to train 300+ scouts aged 5-20 in outdoor survival, leadership, and communication from leading 150+ workshops, 30+ camping trips. Organized 17+ fundraisers, raising $40,000+ for youth programs. Earned 7 national awards for service. Scouts we trained have earned the most awards in BC!
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Water Rescue Leader - Scouts Canada Jun 2010 - Present
Led team of 6 rescuers (senior rescuer since 2018) to pilot watercraft and aid sailors in distress each summer (hiatus in clerkship). Responsible for 200+ sailors over the years without major incident.

Sailing Instructor - Scouts Canada Jun 2010 - Present
Led volunteer-run nonprofit sailing program accessible to all youth backgrounds. Taught theory and coached in-water to 200+ students. Repaired boats with custom 3D-printed parts to reduce costs.

Extracurricular Interests and Hobbies

Collegiate Trivia Sep 2016 - Present
I compete on the Queen's Quizbowl team (and previously at UBC) and organize local tournaments for medical students. I hope in the future to organize local trivia leagues and audition for Jeopardy!

Hackathon Competitor Oct 2015 - Present
Participated in 6 hackathons collaborating with engineers and medical students to build prototypes such as an implant detector or self-driving robots. Won the 2015 Google Games programming competition.

Robotics - Rapid Circuit Fabrication and 3D Printing Sep 2015 - Present
I build low-cost devices using electromechanical circuits and 3D-printing. Currently I am making custom trivia buzzers and printing knockoff boat repair parts to aid our non-profit sailing program.

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!

Survival Camping Aug 2010 - Present
2-3 times a year our adventurists group camp in nearby mountains or deserted islands in the Strait of Georgia.

Puzzle Collecting
I collect mechanical puzzles, like Rubik's Cubes and 3D mazes. My favourites are high difficulty puzzles with simple solutions, current favorite is the "Iwasawa Square in the Bag".

Recreational Dodgeball Sep 2017 - Present
I compete at Queen's intramural and Vancouver dodgeball leagues.

Recreational Table Tennis Sep 2010 - Present
I play table tennis in local leagues, previously played competitively at the provincial level.

Languages

English - Fluent
French - Basic proficiency
Cantonese - Fluent
Mandarin - Basic proficiency
Programming/Scripting: C, C++, Python, MATLAB, Java, SQL, Bash, LaTeX, Git