



PERSONAL

Robert Amelard, PhD

NSERC Postdoctoral Fellow
Research Scientist, Schlegel-UW Research Institute for Aging
250 Laurelwood Dr, Waterloo, Ontario, Canada, N2J 0E2
<https://the-ria.ca/researcher/robert-amelard-phd/>

Adjunct Research Professor
Western University, Department of Biophysics
Schulich School of Medicine and Dentistry
1151 Richmond St, London, Ontario, Canada, N6A 3K7

EDUCATION AND RESEARCH POSITIONS

Adjunct Research Professor Sep 2018–Present
WESTERN UNIVERSITY London, ON
Focus: Biophotonic technologies for assessing brain health in critical care.

Research Scientist and NSERC Postdoctoral Fellow Sep 2017–Present
SCHLEGEL-UW RESEARCH INSTITUTE FOR AGING Waterloo, ON
Focus: Integrative cardiovascular biosensors and physiological modeling for assessing cardiovascular function.
Keywords: cardiovascular biosensors, computer vision, physiological modeling, machine learning, microgravity simulation

Visiting Researcher Aug 2016, Feb 2017, Jul 2018
UNIVERSITY OF CALIFORNIA IRVINE Irvine, CA
Focus: Computational biophotonics, computer vision and image processing for advanced tissue assessment.

Visiting Researcher Sep 2017
UNIVERSITY OF ALBERTA Edmonton, AB
Focus: Cardiovascular biophotonic assessment for ischemic stroke prescreening and prevention.

Doctor of Philosophy (Ph.D.) Alumni Gold Medal 2013–2017
UNIVERSITY OF WATERLOO Waterloo, ON
Thesis: Widefield computational biophotonic imaging for spatiotemporal cardiovascular hemodynamic monitoring
Keywords: computational biophotonics, statistical modeling, biomedical image/signal processing, medical device design, machine learning
Nominated for Millennium Technology Prize, Technology Academy Finland

Master of Applied Science (M.A.Sc.) 2011–2013
UNIVERSITY OF WATERLOO Waterloo, ON
Thesis: High-level intuitive features (HLIFs) for melanoma detection
machine learning, statistical classification, feature extraction, biomedical image processing

Bachelor of Software Engineering (B.S.E.) with distinction 2006–2011
UNIVERSITY OF WATERLOO Waterloo, ON
Keywords: multi-tiered software systems, client/server systems, distributed systems, human-computer interaction, augmented reality

RESEARCH AND SCHOLARSHIP

PRIMARY RESEARCH INTERESTS

- Computational biophotonics | Physiological monitoring | Cardiovascular biosensors
- Computer vision | Image and signal processing | Machine learning
- Cerebrovascular and cardiovascular physiology | Microgravity space flight

AWARDS/HONOURS

Alumni Gold Medal	University of Waterloo	most outstanding doctoral academic achievement	2017
NSERC Postdoctoral Fellowship	NSERC	ranked 6/94	2017-2019
Best Imaging Paper Award	Conference on Computer Vision and Imaging Systems		2017
Newport Research Excellence Award	SPIE/Newport		2017
Carl Pollock Postgraduate Fellowship	University of Waterloo		2017
Computational Biophotonics Research Fellowship	University of California Irvine		2016
Innovators Den Runner-Up	RIA		2016
3 Minute Thesis Department Heat Runner-Up	University of Waterloo		2016
Graduate Award in Technology and Aging	AGE-WELL Network of Centres of Excellence		2015-2017
Accelerate Graduate Research Award	Mitacs		2014
Alexander Graham Bell Canadian Graduate Scholarship-Doctoral	NSERC		2013-2016
Presidents Graduate Scholarship	University of Waterloo		2013-2016
Faculty of Engineering Graduate Scholarship	University of Waterloo		2013
Special Graduate Scholarship	University of Waterloo		2013
Best Presentation-Graduate Research Symposium	University of Waterloo		2013
Sandford Fleming Foundation Teaching Assistantship Excellence	University of Waterloo		2012
Alexander Graham Bell Canadian Graduate Scholarship-Masters	NSERC		2011-2012
Presidents Graduate Scholarship	University of Waterloo		2011-2012
Best Demonstration-Capstone Design Symposium	QUALCOMM		2011

*RIA-Schlegel-UW Research Institute for Aging | SPIE-International Society for Optics and Photonics | NSERC-Natural Sciences and Engineering Research Council of Canada

Where applicable, these honours have been highlighted with the associated entry below.

PUBLICATIONS

My research straddles the fields of biomedical engineering and health sciences. I have published my biomedical engineering research primarily in top-tier biomedical optics and biomedical engineering journals: Biomedical Optics Express ($IF_5=3.5$, $h_5=50$), J. Biomedical Optics ($IF_5=2.7$, $h_5=48$), and IEEE Transactions on Biomedical Engineering ($IF_5=3.4$, $h_5=64$). I have published my cardiovascular physiology discovery papers in top-tier physiology journals or multidisciplinary journals: Journal of Applied Physiology ($IF_5=3.5$, $h_5=54$), Scientific Reports ($IF_5=4.8$, $h_5=131$).

Journal Publications Published/Accepted (10)

- [J1] K. J. Pfisterer, **R. Amelard**, A. G. Chung, and A. Wong, “A new take on measuring relative nutritional density: The feasibility of using a deep neural network to assess commercially-prepared puréed food concentrations,” *Journal of Food Engineering* **223**, 220–235 (2018)
- [J2] T. Beltrame, **R. Amelard**, A. Wong, and R. L. Hughson, “Extracting aerobic system dynamics during unsupervised activities of daily living using wearable sensor machine learning models,” *Journal of Applied Physiology* **124**(2), 473–481 (2018)
- [J3] T. Beltrame, **R. Amelard**, A. Wong, and R. Hughson, “Prediction of oxygen uptake dynamics by machine learning analysis of wearable sensors during activities of daily living,” *Scientific Reports* **7**, 45738 (2017)

- [J4] **R. Amelard**, R. L. Hughson, D. K. Greaves, K. J. Pfisterer, J. Leung, D. A. Clausi, and A. Wong, “Non-contact hemodynamic imaging reveals the jugular venous pulse waveform,” *Scientific Reports* **7**, 40150 (2017)
- [J5] **R. Amelard**, D. A. Clausi, and A. Wong, “Spatial probabilistic pulsatility model for enhancing photoplethysmographic imaging systems,” *Journal of Biomedical Optics* **21**(11), 116010 (2016)
- [J6] T. Beltrame, **R. Amelard**, R. Villar, M. J. Shafiee, A. Wong, and R. L. Hughson, “Estimating oxygen uptake and energy expenditure during treadmill walking by neural network analysis of easy-to-obtain inputs,” *Journal of Applied Physiology* **121**(5), 1226–1233 (2016)
- [J7] **R. Amelard**, D. A. Clausi, and A. Wong, “Spectral-spatial fusion model for robust blood pulse waveform extraction in photoplethysmographic imaging,” *Biomedical Optics Express* **7**(12), 4874–4885 (2016)
- [J8] **R. Amelard**, C. Scharfenberger, F. Kazemzadeh, K. J. Pfisterer, B. S. Lin, D. A. Clausi, and A. Wong, “Feasibility of long-distance heart rate monitoring using transmittance photoplethysmographic imaging (PPGI),” *Scientific Reports* **5**, 14637 (2015) **Altmetric: 160 (top 5%)**
- [J9] **R. Amelard**, J. Glaister, A. Wong, and D. A. Clausi, “High-level intuitive features (HLIFs) for intuitive skin lesion description,” *IEEE Transactions on Biomedical Engineering* **62**(3), 820–831 (2015)
- [J10] J. Glaister, **R. Amelard**, A. Wong, and D. A. Clausi, “MSIM: Multistage illumination modeling of dermatological photographs for illumination-corrected skin lesion analysis,” *IEEE Transactions on Biomedical Engineering* **60**(7), 1873–1883 (2013)

Refereed Conference Publications (28)

- [C1] K. Pfisterer, **R. Amelard**, and A. Wong, “Intuitive data-driven visualization of food relatedness via t-distributed stochastic neighbor embedding,” in *Proc. Conference on Computational Vision and Imaging Systems*, **4**(1) (2018)
- [C2] **R. Amelard**, K. J. Pfisterer, S. Jagani, D. A. Clausi, and A. Wong, “Non-contact assessment of obstructive sleep apnea cardiovascular biomarkers using photoplethysmography imaging,” in *Optical Diagnostics and Sensing XVIII: Toward Point-of-Care Diagnostics, Proc. SPIE*, San Francisco, USA (2018)
- [C3] K. J. Pfisterer, **R. Amelard**, and A. Wong, “Differential color space analysis for investigating nutrient content in a pureed food dilution-flavor matrix: a step toward objective malnutrition risk assessment,” in *Optical Diagnostics and Sensing XVIII: Toward Point-of-Care Diagnostics, Proc. SPIE*, San Francisco, USA (2018)
- [C4] M. Y. Tran, **R. Amelard**, and A. Wong, “Integrating multispectral hemodynamic imaging for bulk tissue oxygenation analysis,” in *Proc. Conference on Computational Vision and Imaging Systems*, **3**(1) (2017) **Best Imaging Paper Award**
- [C5] A. MacLean, K. Pfisterer, **R. Amelard**, A. G. Chung, D. Kumar, and A. Wong, “Goldilocks and the three parameters: empirically finding the “just right” for segmenting food images for the AFINI-T system,” *Proc. Conference on Computational Vision and Imaging Systems* **3**(1) (2017)
- [C6] **R. Amelard**, R. L. Hughson, D. A. Clausi, and A. Wong, “Non-contact arrhythmia assessment in natural settings: a step toward preventive cardiac care,” in *Diagnostic and Therapeutic Applications of Light in Cardiology, Proc. SPIE* **10042**, 1004205, San Francisco, USA (2017)
- [C7] **R. Amelard**, R. L. Hughson, D. K. Greaves, D. A. Clausi, and A. Wong, “Assessing photoplethysmographic imaging performance beyond facial perfusion analysis,” in *Optical Diagnostics and Sensing XVII, Proc. SPIE*, 100720Q, San Francisco, USA (2017) **Student Paper Award**
- [C8] M. Wilson, **R. Amelard**, D. Clausi, and A. Wong, “Co-integrating thermal and hemodynamic imaging for physiological monitoring,” *Proc. Conference on Computational Vision and Imaging Systems* **2**(1), Waterloo, Canada (2016)
- [C9] B. Chwyl, **R. Amelard**, D. Clausi, and A. Wong, “A Bayesian multi-scale framework for photoplethysmogram imaging waveform processing,” in *Proc. Conference on Computational Vision and Imaging Systems*, **2**(1), Waterloo, Canada (2016)

- [C10] B. Chwyl, A. G. Chung, **R. Amelard**, J. Deglint, D. A. Clausi, and A. Wong, “SAPPHIRE: Stochastically acquired photoplethysmogram for heart rate inference in realistic environments,” in *Proc. IEEE International Conference on Image Processing*, 1230–1234 (2016)
- [C11] B. Chwyl, A. G. Chung, **R. Amelard**, J. Deglint, D. A. Clausi, and A. Wong, “Time-frequency domain analysis via pulselets for non-contact heart rate estimation from remotely acquired photoplethysmograms,” in *Proc. Conference on Computer and Robot Vision*, 201–207, Victoria, Canada (2016)
- [C12] **R. Amelard**, D. A. Clausi, and A. Wong, “Coded hemodynamic imaging for non-contact detection of abnormal blood pulse waveforms,” in *Proc. Imaging Network Ontario*, Toronto, Canada (2016)
- [C13] **R. Amelard**, D. A. Clausi, and A. Wong, “Spectral photoplethysmographic imaging sensor fusion for enhanced heart rate detection,” in *Proc. SPIE*, **9701**, 970113, San Francisco, USA (2016)
- [C14] **R. Amelard**, K. J. Pfisterer, D. A. Clausi, and A. Wong, “Non-contact hematoma damage and healing assessment using reflectance photoplethysmographic imaging,” in *Multimodal Biomedical Imaging XI, Proc. SPIE 9701*, 970112, San Francisco, USA (2016)
- [C15] J. Deglint, A. G. Chung, B. Chwyl, **R. Amelard**, F. Kazemzadeh, X. Y. Wang, D. A. Clausi, and A. Wong, “Photoplethysmographic imaging via spectrally demultiplexed erythema fluctuation analysis for remote heart rate monitoring,” in *Multimodal Biomedical Imaging XI, Proc. SPIE 9701*, 970111, San Francisco, USA (2016)
- [C16] **R. Amelard**, J. Leung, D. A. Clausi, and A. Wong, “A portable plug-and-play imaging system for physiological monitoring,” in *Proc. Conference on Computational Vision and Imaging Systems*, **1**, Waterloo, Canada (2015)
- [C17] F. Kazemzadeh, C. Jin, M. Yu, **R. Amelard**, S. Haider, S. Saini, M. Emelko, D. A. Clausi, and A. Wong, “Multispectral digital holographic microscopy with applications in water quality assessment,” in *Novel Optical Systems Design and Optimization XVIII, Proc. SPIE 9579*, 957906, San Diego, USA (2015)
- [C18] D. S. Cho, S. Haider, **R. Amelard**, A. Wong, and D. A. Clausi, “Quantitative features for computer-aided melanoma classification using spatial heterogeneity of eumelanin and pheomelanin concentrations,” in *Proc. IEEE International Symposium on Biomedical Imaging*, 59–62, New York, USA (2015)
- [C19] **R. Amelard**, C. Scharfenberger, A. Wong, and D. A. Clausi, “Illumination-compensated non-contact imaging photoplethysmography via dual-mode temporally-coded illumination,” in *Multimodal Biomedical Imaging X, Proc. SPIE 9316*, 931607, San Francisco, USA (2015)
- [C20] **R. Amelard**, C. Scharfenberger, A. Wong, and D. A. Clausi, “Non-contact assessment of melanin distribution via multispectral temporal illumination coding,” in *Multimodal Biomedical Imaging X, Proc. SPIE 9316*, 93160N, San Francisco, USA (2015)
- [C21] A. Chung, X. Y. Wang, **R. Amelard**, C. Scharfenberger, J. Leong, J. Kulinski, A. Wong, and D. A. Clausi, “High-resolution motion-compensated photoplethysmographic imaging for remote heart rate monitoring,” in *Multimodal Biomedical Imaging X, Proc. SPIE 9316*, 93160A, San Francisco, USA (2015)
- [C22] D. S. Cho, S. Haider, **R. Amelard**, A. Wong, and D. Clausi, “Physiological characterization of skin lesion using non-linear random forest regression model,” in *Proc. Conference of the IEEE Engineering in Medicine and Biology Society*, 3349–3352, Chicago, USA (2014)
- [C23] S. Haider, D. Cho, **R. Amelard**, A. Wong, and D. A. Clausi, “Enhanced classification of malignant melanoma lesions via the integration of physiological features from dermatological photographs,” in *Proc. Conference of the IEEE Engineering in Medicine and Biology Society*, 6455–6458, Chicago, USA (2014)
- [C24] A. Wong, K. A. Scott, E. Li, and **R. Amelard**, “Continuous sea ice thickness estimation using a joint modis and amsr-e guided variational model,” in *Proc. IEEE International Geoscience and Remote Sensing Symposium*, 4106–4109, Melbourne, Australia (2013)
- [C25] **R. Amelard**, A. Wong, F. Li, and D. A. Clausi, “Unsupervised classification of sea-ice and water using synthetic aperture radar via an adaptive texture sparsification transform,” in *Proc. IEEE International Geoscience and Remote Sensing Symposium*, 3958–3961, Melbourne, Australia (2013)

- [C26] **R. Amelard**, A. Wong, and D. A. Clausi, “Unsupervised classification of agricultural land cover using polarimetric synthetic aperture radar via a sparse texture dictionary model,” in *Proc. IEEE International Geoscience and Remote Sensing Symposium*, 4383–4386, Melbourne, Australia (2013)
- [C27] **R. Amelard**, A. Wong, and D. A. Clausi, “Extracting morphological high-level intuitive features (HLIF) for enhancing skin lesion classification,” in *Proc. Conference of IEEE Engineering in Medicine and Biology Society*, 4458–4461, San Diego, USA (2012)
- [C28] **R. Amelard**, A. Wong, and D. A. Clausi, “Extracting high-level intuitive features (HLIF) for classifying skin lesions using standard camera images,” in *Proc. Conference on Computer and Robot Vision*, 396–403, Toronto, Canada (2012)

Patents (2)

- [P1] **R. A. Amelard** and A. S. L. Wong, “System and method for spatial cardiovascular monitoring,” *U.S. Patent 62/270409 Patent Pending* (Dec 21 2016)
Also filed as: Canada Patent 2,952,485
- [P2] G. Valsan, S. Z. Mahmoodabadi, R. B. Wagner, D. Priest, and **R. Amelard**, “Multispectral medical imaging devices and methods thereof,” *US Patent 14/341103 Issued* (Jul 25 2014)
Also issued as: Europe Patent EP2977003, Japan Patent JP2016030214, China Patent CN105286785, Hong Kong Patent HK1215142

Books (1)

- [B1] A. Wong, J. R. Wallace, E. A. Lee, X. Wang, V. Cheung, A. Kumar, **R. Amelard**, and I. Ivkovic, *Data Structures and Algorithms in a Nutshell*, University of Waterloo (2015)

Book Chapters (2)

- [BC1] **R. Amelard** and A. Wong, “Hemodynamic imaging,” in *Encyclopedia of Biomedical Engineering*, R. Narayan, Ed., Elsevier, 1st ed. (2018). (In Press, Invited)
- [BC2] **R. Amelard**, J. Glaister, A. Wong, and D. A. Clausi, “Melanoma decision support using lighting-corrected intuitive feature models,” in *Computer Vision Techniques for the Diagnosis of Skin Cancer*, J. Scharcanski and M. E. Celebi, Eds., *Series in BioEngineering*, 192–219, Springer, Heidelberg (2013)

Theses (2)

- [T1] **R. Amelard**, “Widefield Computational Biophotonic Imaging for Spatiotemporal Cardiovascular Hemodynamic Monitoring,” *PhD Thesis, University of Waterloo* (2017). <http://hdl.handle.net/10012/12066>
- [T2] **R. Amelard**, “High-Level Intuitive Features (HLIFs) for Melanoma Detection,” *Master’s Thesis, University of Waterloo* (2013). <http://hdl.handle.net/10012/7761>

Industry R&D Publications (3)

- [I1] **R. Amelard**, “Feasibility assessment of non-invasive heart rate monitoring system for clinical use.” for Hill-Rom Inc. (2016)
- [I2] **R. Amelard**, “A real-time multispectral melanin compensation algorithm for tissue oxygen imaging.” for Christie Medical Holdings (2013)
- [I3] **R. Amelard**, C. Scharfenberger, A. Wong, and D. A. Clausi, “An image processing system for determining parcel dimensions.” for Rogue Specialty Transportation (2013)

PRESENTATIONS

I have delivered 33 presentations in 3 countries (Canada, USA, Australia), including 4 invited seminar talks, and have received 3 honours.

Invited Seminar Talks

- [P1] “Detecting atrial fibrillation in blood pulse signals using generated datasets.” Machine Learning Research Group Seminar (University of Guelph, Guelph, Aug 2018)
- [P2] “Co-integrating biophotonics, wearable sensors, signal processing and artificial intelligence for assessing age-related biomarkers.” Laser Microbeam and Medical Program Seminar (University of California Irvine, Irvine, Jul 2018)
- [P3] “Assessing widefield hemodynamic pulsatility using computational biophotonic imaging: a co-integration of biomedical optics, electronic control, image processing and machine learning.” Alberta Machine Intelligence Institute Seminar (University of Alberta, Edmonton, Sep 2017)
- [P4] “Non-contact hemodynamic monitoring.” Laser Microbeam and Medical Program Seminar (University of California Irvine, Irvine, Aug 2016)

Academic Presentations

- [P5] “Coded Hemodynamic Imaging: an infrared eye into the body.” Cerebral Hypoperfusion Summit (Schlegel-UW Research Institute for Aging, Waterloo, Apr 2018)
- [P6] “Engineering meets cardiovascular physiology: Non-contact blood pulse imaging for new ways of monitoring cardiovascular health.” Research Seminar (Schlegel-UW Research Institute for Aging, Waterloo, Feb 2018)
- [P7] “Non-contact assessment of obstructive sleep apnea cardiovascular biomarkers using photoplethysmography imaging.” Optical Diagnostics and Sensing XVIII (SPIE Photonics West, San Francisco, Jan 2018)
- [P8] “Non-contact arrhythmia assessment in natural settings: a step toward preventive cardiac care.” Diagnostic and Therapeutic Applications of Light in Cardiology (SPIE Photonics West, San Francisco, Jan 2017)
- [P9] “Assessing photoplethysmographic imaging performance beyond facial perfusion analysis.” Optical Diagnostics and Sensing XVII (SPIE Photonics West, San Francisco, Jan 2017)
- [P10] “Photoplethysmographic imaging for non-contact blood pulse detection.” Systems Design Engineering Seminar (University of Waterloo, Waterloo, Sep 2015)
- [P11] “Intelligent clinical decision support system for melanoma cancer management.” Agfa Healthcare (Waterloo, Jul 2015)
- [P12] “Illumination-compensated non-contact imaging photoplethysmography via dual-mode temporally-coded illumination.” Multimodal Biomedical Imaging X (SPIE Photonics West, San Francisco, Feb 2015)
- [P13] “Skin lesion classification system: image processing summary.” Agfa Healthcare (Waterloo, Apr 2014)
- [P14] “Unsupervised classification of agricultural land cover using SAR via a sparse texture dictionary model.” IEEE International Geoscience and Remote Sensing Symposium (Melbourne, Australia, Jul 2013)
- [P15] “Unsupervised classification of sea-ice using SAR via an adaptive texture sparsifying transform.” IEEE International Geoscience and Remote Sensing Symposium (Melbourne, Australia, Jul 2013)
- [P16] “Continuous sea ice thickness estimation using a joint MODIS/AMSR-E guided variational model.” IEEE International Geoscience and Remote Sensing Symposium (Melbourne, Australia, Jul 2013)
- [P17] “Importance of intuitive features in clinical decision support systems.” University of Waterloo Research Symposium (Waterloo, Mar 2013) **Best Oral Presentation**
- [P18] “Progress on a clinical decision support system for detecting melanoma.” Agfa Healthcare (Waterloo, Sep 2012)

- [P19] “Perceptual structure distortion ratio: an image quality metric based on robust measures of complex phase order.” Conference on Computer and Robot Vision (Toronto, May 2012)
- [P20] “Extracting high-level intuitive features (hlif) for classifying skin lesions using standard camera images.” Conference on Computer and Robot Vision (Toronto, May 2012)
- [P21] “Extracting high-level intuitive features to enhance skin cancer detection.” Graduate Student Research Conference (Waterloo, Apr 2012)
- [P22] “A computational framework for recognizing handwritten matrices.” Symbolic Computation Research Seminar (Waterloo, Apr 2010)
- [P23] “A system for tracking and managing a managed assets program.” TD Asset Management (Toronto, Aug 2009)

Non-Academic Presentations

- [P24] “New technologies for health monitoring.” Lunch With Residents Research Seminar (Schlegel-UW Research Institute for Aging, Waterloo, Oct 2018)
- [P25] “How can a computer see your blood?.” Curiosity Fair (Schlegel-UW Research Institute for Aging, Waterloo, May 2018)
- [P26] “Blood flow imaging and demystifying academic research.” Biomedical Engineering Undergraduate Seminar (Waterloo, May 2017)
- [P27] “Improving quality of care through touchless vitals monitoring.” Innovators Den (Schlegel Villages Innovation Summit, Toronto, Jun 2016) **Runner-Up**
- [P28] “Revolutionizing baby monitoring with cutting-edge imaging research.” Velocity Fund Finals (Waterloo, Mar 2016)
- [P29] “Touchless vitals monitoring: pushing toward preventive healthcare.” 3 Minute Thesis Competition (Waterloo, Mar 2016) **Runner-Up, Department Heat**
- [P30] “Inventing an imaging system and how to get people excited about your research.” Vision and Image Processing Research Seminar (Waterloo, Feb 2016)
- [P31] “Graduate School—What I wish I knew in 3rd year.” Software Engineering Undergraduate Symposium (Waterloo, Oct 2015)
- [P32] “The cardiovascular system: a primer for biomedical engineering applications.” Vision and Image Processing Research Seminar (Waterloo, Jan 2014)
- [P33] “Making an academic poster.” Rockway Mennonite Collegiate (Kitchener, Jan 2013)

RESEARCH FUNDING

Bed rest in older adults accelerates aging-like changes (submitted)
Co-Applicant | Canadian Institutes of Health Research
\$137,500 CAD

Coded hemodynamic imaging to advance astronaut health 2018–2020
Co-Applicant | Canada Space Agency Flights and Fieldwork for the Advancement of Science and Technology
\$400,000 CAD

MAchine Learning and Computer Vision to Enhance the Detection of STROke (MAE-STRO): Pilot and Feasibility Study 2017–2019
Co-Applicant | Quality Improvement & Clinical Research Alberta Stroke Program
\$24,900 CAD

Smart heart rate and breath rate monitoring framework using cameras Co-Applicant Hill-Rom Inc. \$30,000 USD	2017
Advanced aging ResearCH (ARCH) to transform health and well-being of older adults Collaborator Canadian Foundation for Innovation \$1,387,023 CAD	2015
A mixing model for inferring oxygen status from multispectral imaging Collaborator Mitacs \$15,000 CAD	2013

PUBLIC MEDIA ATTENTION

*My research received international public media attention following my 2015 Scientific Reports paper, including being featured on Discovery Channel's **Daily Planet**, **OmniTV**, and various newspaper, radio, and online media outlets. Consequently, my article received 160 Altmetric social impact score, top 5% of all ranked journal publications.*

Curiosity of the Ages on Display at RIA RIA Research Highlights	June 2018
Smart clothing aims to predict failing health Waterloo Stories	May 2018
Curiosity Fair unites inquisitive minds of all ages The Record	May 2018
UW unveils new artificial intelligence lab [VIDEO] CTV News	Apr 2018
Waterloo Launches AI Institute [VIDEO] University of Waterloo	Apr 2018
Waterloo Artificial Intelligence Institute—A Message from the Co-Directors [VIDEO] UWaterloo	Apr 2018
Cultivating and spreading innovation Research Matters	Jul 2016
It takes a village: Lab Profile LAB Business Magazine	Feb 2016
Preventing medical emergencies through vascular imaging University of Waterloo's Student Success Office Blog	Feb 2016
Getting under your skin: A video camera that tracks blood flow Waterloo Stories	Jan 2016
New touchless device makes earlier detection of heart problems possible Waterloo News	Jan 2016
<i>Featured on:</i> Discovery Channel's The Daily Planet and OmniTV News .	
<i>Selected appearances:</i> Yahoo! News, The Engineer, Science Daily, Phys.org, Gizmag, Sina, Exchange Magazine, Design Engineering, United Press International, International Business Times, Big News Network, NDTV, Seattle Bulletin, 570 news, Imprint Newspaper	
<i>Translated to:</i> French, German, Russian, Chinese, Spanish, Arabic, Indonesian	
Building collaborative internships with a win-win mentality AGE-WELL Blog	Nov 2015

TEACHING

COURSE INSTRUCTOR

MTE 140 Data Structures and Algorithms University of Waterloo	Jan–Apr 2019
MTE 140 Data Structures and Algorithms University of Waterloo (117 students)	Jan–Apr 2018

TEACHING ASSISTANTSHIPS

TA evaluation (mean,std)=(9.75,0.38) (out of 10, n=4 submitted)

BME 122 Data Structures and Algorithms 54 students (no evaluation submitted)	Jan–Apr 2017
BME 122 Data Structures and Algorithms 54 students (no evaluation submitted)	Jan–Apr 2016
BME 122 Data Structures and Algorithms 41 students, 10/10 evaluation	Jan–Apr 2015

SYDE 575 Image Processing	50 students, 9.2 evaluation	Sep–Dec 2014
MTE 140 Data Structures and Algorithms	142 students, 9.8/10 evaluation	May–Aug 2014
MTE 140 Data Structures and Algorithms	121 students (no evaluation submitted)	May–Aug 2012
SYDE 121 Digital Computation	97 students, 10/10 evaluation	Sep–Dec 2011
Sandford Fleming Foundation Teaching Assistantship Excellence Award		

COURSE DEVELOPMENT

Data Structures and Algorithms in a Nutshell: MTE140/BME122 Course Textbook, A Wong, JR Wallace, EA Lee, X Wang, V Cheung, A Kumar, **R Amelard**, I Ivkovic, University of Waterloo, 2016.

GUEST LECTURES

Trees and Heaps	MTE 140 Data Structures and Algorithms	Mar 2015
C++ Memory and Classes	BME 122 Data Structures and Algorithms	Feb 2015
Colour Image Processing	SYDE 575 Image Processing	Nov 2014
Scaling Software Systems using Data Structures and Algorithms	MTE 140 Data Structures and Algorithms	Jul 2014
Pattern Recognition in Biomedical Applications	SYDE 372 Pattern Recognition	Apr 2014
Insertions/Deletions in Linked and Array Lists	MTE 140 Data Structures and Algorithms	Mar 2013

TEACHING CERTIFICATIONS

Certificate in Fundamentals of University Teaching Centre of Teaching Excellence May 2014
Course for developing teaching strategies, knowledge and skills. Consisted of 6 workshops, 3 microteaching session evaluations, and 2 full guest lectures evaluation.

SUPERVISORY ACTIVITIES

UNDERGRADUATE SUPERVISION

Monica Hanna Biomedical Sciences	Sep 2018–Dec 2018
“Designing and fabricating tunable optical tissue phantom models”	
Lucille Huang Mechatronics Engineering	Sep 2018–Dec 2018
“Integrating physiological data repositories for cardiovascular artificial intelligence modeling”	
Braeden Syrnyk Mechatronics Engineering	May 2018–Present
“Recurrent neural networks and dataset generation for arrhythmia detection”	
Alex Tobias Mechatronics Engineering	Jan–Apr 2018
“Arrhythmia dataset generation and cleaning”	
Francois Barnard Mechatronics Engineering	Jan–Apr 2018
“Biomedical imaging calibration and tracking for cerebrovascular monitoring”	
Milind Paliath Systems Design Engineering	Jan–Apr 2018
“Medical device data extraction and integration with clinical patient monitors”	
Yanyan Tran Biomedical Engineering	May–Dec 2017
“Multispectral biophotonic imaging system design and development”	

Alexander Maclean Biomedical Engineering “RGB-D imaging analysis for widefield nutrient quantification at the plate level”	May–Aug 2017
Mujtaba Tirmizi Mechatronics Engineering “Multimodal physiological monitoring system development”	Jan–Apr 2017
Jordan Guerten Biomedical Engineering “Multispectral optical system development”	Jan–Apr 2017
Shubh Jagani Systems Design Engineering “Non-intrusive sleep apnea detection using wavelet-based machine learning”	Sep 2016–Apr 2017
Mikaela MacMahon Biomedical Engineering “Embedded thermal imaging calibration and integration”	Sep–Dec 2016
Mackenzie Wilson Biomedical Engineering “Opto-electronic biomedical imaging system development”	Apr–Dec 2016
Jason Leung Biomedical Engineering “Development and manufacturing (3D print, machining) hardware for portable biomedical imaging”	May–Aug 2015, Sep–Dec 2017
Bill S. Lin Mechatronics Engineering “Biomedical hemodynamic image analysis”	Sep 2014–Apr 2017
Audrey Chung Systems Design Engineering “Extracting heart rate from ambient smartphone cameras”	Jan–Apr 2014
Eura Cho, Sara Greenberg, Sharon Leung, Michelle Pugne, Emily Sim Systems Design Eng. “Real-time parking lot computer vision analytics platform”	Jan–Apr 2013

PROFESSIONAL ACTIVITIES

PROFESSIONAL AFFILIATIONS

Member, SPIE	Jan 2015–Present
Member, IEEE	Mar 2012–Present
Member, IEEE Engineering Medicine and Biology Society	Jan 2012–Present

CONFERENCE COMMITTEE ACTIVITIES

Program Committee Member 2nd International Workshop on Computer Vision for Physiological Measurement (part of Conference on Computer Vision and Pattern Recognition)	2018
Conference Organization Committee Cerebral Hypoperfusion Summit	2018
Program Committee Member 1st International Workshop on Computer Vision for Physiological Measurement (part of Conference on Computer Vision and Pattern Recognition)	2017
Conference Organization Committee 3rd Annual Conference on Vision and Imaging Systems	2017
Conference Coordinator 2nd Annual Conference on Vision and Imaging Systems	2016
Conference Coordinator 1st Annual Conference on Vision and Imaging Systems	2015
Conference Organization Committee International Society for Gravitational Physiology Aging in Space Symposium	2014

SERVICE ACTIVITIES

Volunteer	Ontario Blind Sports Association	2017–Present
Regional Science Fair Judge	Waterloo-Wellington Science and Engineering Fair	Apr 2018
Science Fair Judge	Centennial Public School	Mar 2018
Engineering Design Project Judge	UWaterloo Software Engineering Capstone Design Symposium	Mar 2017
Computer Vision Elementary School Outreach Coordinator	KW Bilingual School	Dec 2015
Engineering Design Project Judge	UWaterloo Engineering Design Project Symposium	Nov 2014
Sectional Lead	Engineering Jazz Band	Jan–Apr 2010

PROFESSIONAL DEVELOPMENT

Innovators of Tomorrow Certificate	AGE-WELL Network of Centres of Excellence	Nov 2016
Teaching and Learning Conference	University of Waterloo	May 2014
Mitacs Team Building Excellence Workshop	Mitacs	Aug 2013

EMPLOYMENT HISTORY

Medical Device Research Intern Jan–Apr 2014
 CHRISTIE MEDICAL HOLDINGS Kitchener, ON
Developed novel biophotonic models for a real-time multispectral biophotonic tissue assessment for use in a commercial medical device. Patent published.

Software Engineer Intern May–Aug 2011
 GOOGLE INC Kitchener, ON
Developed massively distributed ads software server serving millions of hits per hour globally. Improved load efficiency by over 10%.

NSERC Undergraduate Research Assistant–Symbolic Computation Sep–Dec, Jan–Apr 2010
 SCHOOL OF COMPUTER SCIENCE, UNIVERSITY OF WATERLOO Waterloo, ON
Developed computational method for interpreting and parsing hand-written mathematics for engineering applications.

Quantitative Finance Developer May–Aug 2009
 TD ASSET MANAGEMENT Toronto, ON
Developed data mining techniques to deliver rich financial model analysis for fund managers.

Medical Imaging Software Developer Sep–Dec 2008
 AGFA HEALTHCARE Waterloo, ON
Developed software framework for handling mammography medical images in radiology hospital imaging systems (PACS).

R&D Software Developer Jan–Apr 2008, May–Aug 2007
 UNCHARTERED SOFTWARE Toronto, ON
Integrated real-time online geographical map retrieval and rendering from open-source map servers.

REFeree ACTIVITIES

JOURNAL REFEREEING

Biomedical Optics Express
 Journal of Biomedical Optics
 OSA Continuum
 IEEE Transactions on Biomedical Engineering

IEEE Transactions on Medical Imaging
IEEE Transactions on Emerging Topics in Computational Intelligence
IEEE Journal of Biomedical and Health Informatics
IEEE Access
Sensors
IEEE Transactions on Systems, Man and Cybernetics
Computer Methods and Programs in Biomedicine
Current Medical Imaging Reviews
American Journal of Physiology – Heart and Circulatory Physiology
Scientific Reports (Nature Publishing Group)

CONFERENCE REFEREEING

Conference on Computer Vision and Pattern Recognition (CVPR)	2018
Conference on Biological Information and Biomedical Engineering (BIBE)	2018
IEEE International Symposium on Biomedical Engineering (ISBI)	2015–2017

GRANT REVIEW

Centre for Bioengineering and Biotechnology Seed Funding	2018
Ontario Research Fund, Ministry of Research Innovation and Science	2017

ADDITIONAL INTERESTS

Hockey goaltending
Road cycling [[Strava profile](#)]
Coppersmithing [[Photos](#)]
Alto saxophone and electric guitar
Reading