



## PERSONAL

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### Robert Amelard, PhD

NSERC Postdoctoral Fellow

Schlegel-UW Research Institute for Aging

250 Laurelwood Dr

Waterloo, Ontario, Canada, N2J 0E2

<http://www.the-ria.ca/research-education/researchers/ria-research-scientists/dr-robert-amelard>

Visiting Researcher

University of Alberta, Department of Medicine

2J2.00 WC Mackenzie Health Sciences Centre

8440 112 St. NW

Edmonton, Alberta, Canada, T6G 2R7

<https://www.ualberta.ca/medicine/about/people/robert-amelard>

## EDUCATION AND RESEARCH POSITIONS

### Visiting Researcher

Sep 2017–Present

UNIVERSITY OF ALBERTA Edmonton, AB

**Focus:** Cardiovascular biophotonic assessment for ischemic stroke prescreening and prevention.

### NSERC Postdoctoral Fellow

Sep 2017–Present

SCHLEGEL-UW RESEARCH INSTITUTE FOR AGING Waterloo, ON

**Focus:** Innovative cardiovascular biosensors and physiological modeling for cardiovascular disease detection.

**Keywords:** cardiovascular biosensors, computer vision, physiological modeling, machine learning, microgravity simulation

### Visiting Researcher

Aug 2016, Feb 2017

UNIVERSITY OF CALIFORNIA IRVINE Irvine, CA

**Focus:** Multimodal integration of hemodynamic and spatial frequency domain imaging technologies for advanced tissue assessment.

### 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

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## PRIMARY RESEARCH INTERESTS

- Physiological modeling, Computational biophotonics, Cardiovascular biosensors
- Machine learning, Computer vision, Image and signal processing
- Cerebrovascular and cardiovascular disease, Microgravity space flight

## AWARDS/HONOURS

<b>Alumni Gold Medal</b>	University of Waterloo	<b>most outstanding doctoral academic achievement</b>	2017
<b>NSERC Postdoctoral Fellowship</b>	NSERC	<b>ranked 6/94</b>	2017-2019
<b>Best Imaging Paper Award</b>	Conference on Computer Vision and Imaging Systems		2017
<b>Newport Research Excellence Award</b>	SPIE/Newport		2017
<b>Carl Pollock Postgraduate Fellowship</b>	University of Waterloo		2017
<b>Computational Biophotonics Research Fellowship</b>	University of California Irvine		2016
<b>Innovators Den Runner-Up</b>	RIA		2016
<b>3 Minute Thesis Department Heat Runner-Up</b>	University of Waterloo		2016
<b>Graduate Award in Technology and Aging</b>	AGE-WELL Network of Centres of Excellence		2015-2017
<b>Accelerate Graduate Research Award</b>	Mitacs		2014
<b>Alexander Graham Bell Canadian Graduate Scholarship-Doctoral</b>	NSERC		2013-2016
<b>Presidents Graduate Scholarship</b>	University of Waterloo		2013-2016
<b>Faculty of Engineering Graduate Scholarship</b>	University of Waterloo		2013
<b>Special Graduate Scholarship</b>	University of Waterloo		2013
<b>Best Presentation-Graduate Research Symposium</b>	University of Waterloo		2013
<b>Sandford Fleming Foundation Teaching Assistantship Excellence</b>	University of Waterloo		2012
<b>Alexander Graham Bell Canadian Graduate Scholarship-Masters</b>	NSERC		2011-2012
<b>Presidents Graduate Scholarship</b>	University of Waterloo		2011-2012
<b>Best Demonstration-Capstone Design Symposium</b>	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 physiology. I publish 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 publish 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 unpervised 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 (27)

- [C1] **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)
- [C2] 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)
- [C3] 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**
- [C4] 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)
- [C5] **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)
- [C6] **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**
- [C7] 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)
- [C8] 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)
- [C9] 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)

- [C10] 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)
- [C11] **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)
- [C12] **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)
- [C13] **R. Amelard**, K. J. Pfistererb, D. A. Clausia, and A. Wonga, “Non-contact hematoma damage and healing assessment using reflectance photoplethysmographic imaging,” in *Multimodal Biomedical Imaging XI, Proc. SPIE* **9701**, 970112, San Francisco, USA (2016)
- [C14] 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)
- [C15] **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)
- [C16] 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)
- [C17] 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)
- [C18] **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)
- [C19] **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)
- [C20] 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)
- [C21] 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)
- [C22] 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)
- [C23] 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)
- [C24] **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)
- [C25] **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)

- [C26] **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)
- [C27] **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 28 presentations in 3 countries (Canada, USA, Australia), including 2 invited seminar talks, and have received 3 honours.*

## Invited Seminar Talks

- [P1] “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)
- [P2] “Non-contact hemodynamic monitoring.” Laser Microbeam and Medical Program Seminar (University of California Irvine, Irvine, Aug 2016)

## Academic Presentations

- [P3] “Coded Hemodynamic Imaging: an infrared eye into the body.” Cerebral Hypoperfusion Summit (Schlegel-UW Research Institute for Aging, Waterloo, Apr 2018)
- [P4] “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)
- [P5] “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)
- [P6] “Assessing photoplethysmographic imaging performance beyond facial perfusion analysis.” Optical Diagnostics and Sensing XVII (SPIE Photonics West, San Francisco, Jan 2017)
- [P7] “Photoplethysmographic imaging for non-contact blood pulse detection.” Systems Design Engineering Seminar (University of Waterloo, Waterloo, Sep 2015)
- [P8] “Intelligent clinical decision support system for melanoma cancer management.” Agfa Healthcare (Waterloo, Jul 2015)
- [P9] “Illumination-compensated non-contact imaging photoplethysmography via dual-mode temporally-coded illumination.” Multimodal Biomedical Imaging X (SPIE Photonics West, San Francisco, Feb 2015)
- [P10] “Skin lesion classification system: image processing summary.” Agfa Healthcare (Waterloo, Apr 2014)
- [P11] “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)
- [P12] “Unsupervised classification of sea-ice using SAR via an adaptive texture sparsifying transform.” IEEE International Geoscience and Remote Sensing Symposium (Melbourne, Australia, Jul 2013)
- [P13] “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)
- [P14] “Importance of intuitive features in clinical decision support systems.” University of Waterloo Research Symposium (Waterloo, Mar 2013) **Best Oral Presentation**
- [P15] “Progress on a clinical decision support system for detecting melanoma.” Agfa Healthcare (Waterloo, Sep 2012)
- [P16] “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)
- [P17] “Extracting high-level intuitive features (hlf) for classifying skin lesions using standard camera images.” Conference on Computer and Robot Vision (Toronto, May 2012)
- [P18] “Extracting high-level intuitive features to enhance skin cancer detection.” Graduate Student Research Conference (Waterloo, Apr 2012)
- [P19] “A computational framework for recognizing handwritten matrices.” Symbolic Computation Research Seminar (Waterloo, Apr 2010)
- [P20] “A system for tracking and managing a managed assets program.” TD Asset Management (Toronto, Aug 2009)

## Non-Academic Presentations

- [P21] “Blood flow imaging and demystifying academic research.” Biomedical Engineering Undergraduate Seminar (Waterloo, May 2017)
- [P22] “Improving quality of care through touchless vitals monitoring.” Innovators Den (Schlegel Villages Innovation Summit, Toronto, Jun 2016) **Runner-Up**
- [P23] “Revolutionizing baby monitoring with cutting-edge imaging research.” Velocity Fund Finals (Waterloo, Mar 2016)
- [P24] “Touchless vitals monitoring: pushing toward preventive healthcare.” 3 Minute Thesis Competition (Waterloo, Mar 2016) **Runner-Up, Department Heat**
- [P25] “Inventing an imaging system and how to get people excited about your research.” Vision and Image Processing Research Seminar (Waterloo, Feb 2016)
- [P26] “Graduate school—what i wish i knew in 3rd year.” Software Engineering Undergraduate Symposium (Waterloo, Oct 2015)
- [P27] “The cardiovascular system: a primer for biomedical engineering applications.” Vision and Image Processing Research Seminar (Waterloo, Jan 2014)
- [P28] “Making an academic poster.” Rockway Mennonite Collegiate (Kitchener, Jan 2013)

## RESEARCH FUNDING

<b>MAchine Learning and Computer Vision to Enhance the Detection of STROke (MAE-STRO): Pilot and Feasibility Study</b> Co-Investigator   Quality Improvement & Clinical Research Alberta Stroke Program \$24,900 CAD	2017–2019
<b>Smart heart rate and breath rate monitoring framework using cameras</b> Collaborator   Hill-Rom Inc. \$30,000 USD	2017
<b>Advanced aging ResearCH (ARCH) to transform health and well-being of older adults</b> Collaborator   Canadian Foundation for Innovation \$1,387,023 CAD	2015
<b>A mixing model for inferring oxygen status from multispectral imaging</b> Collaborator   Mitacs \$15,000 CAD	2013

PUBLIC MEDIA ATTENTION

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*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.*

<b>UW unveils new artificial intelligence lab</b> CTV News	Apr 2018
<b>Waterloo Launches AI Institute</b> University of Waterloo	Apr 2018
<b>Waterloo Artificial Intelligence Institute—A Message from the Co-Directors</b> UWaterloo	Apr 2018
<b>Cultivating and spreading innovation</b> Research Matters	Jul 2016
<b>It takes a village: Lab Profile</b> LAB Business Magazine	Feb 2016
<b>Preventing medical emergencies through vascular imaging</b> 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 Jan 2016  
News  
*Featured on:* Discovery Channel's **The Daily Planet** and **OmniTV News**.  
*Selected appearances:* 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  
*Translated to:* French, German, Russian, Chinese, Spanish, Arabic, Indonesian  
**Building collaborative internships with a win-win mentality** AGE-WELL Blog Nov 2015

## TEACHING

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### COURSE INSTRUCTOR

**MTE 140 Data Structures and Algorithms** 117 students (evaluation release May 1) Jan–Apr 2018

### TEACHING ASSISTANTSHIPS

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

**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

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### UNDERGRADUATE SUPERVISION

<b>Alex Tobias</b> Mechatronics Engineering “Automatic arrhythmia detection”	Jan–Apr 2018
<b>Francois Barnard</b> Mechatronics Engineering “Biomedical imaging calibration and tracking”	Jan–Apr 2018
<b>Milind Paliath</b> Systems Design Engineering “Medical device data extraction and integration”	Jan–Apr 2018
<b>Yanyan Tran</b> Biomedical Engineering “Efficient biomedical imaging system design and development”	May–Dec 2017
<b>Alexander Maclean</b> Biomedical Engineering “RGB-D imaging analysis for widefield nutrient quantification”	May–Aug 2017
<b>Mujtaba Tirmizi</b> Mechatronics Engineering “Multimodal physiological monitoring system development”	Jan–Apr 2017
<b>Jordan Guerten</b> Biomedical Engineering “Multispectral optical system development”	Jan–Apr 2017
<b>Shubh Jagani</b> Systems Design Engineering “Non-intrusive sleep apnea detection and monitoring”	Sep 2016–Apr 2017
<b>Mikaela MacMahon</b> Biomedical Engineering “Embedded thermal imaging calibration and integration”	Sep–Dec 2016
<b>Mackenzie Wilson</b> Biomedical Engineering “Opto-electronic biomedical imaging system development”	Apr–Dec 2016
<b>Jason Leung</b> Biomedical Engineering “Development and manufacturing (3D print, machining) hardware for portable biomedical imaging”	May–Aug 2015, Sep–Dec 2017
<b>Bill S. Lin</b> Mechatronics Engineering “Biomedical hemodynamic image analysis”	Sep 2014–Apr 2017
<b>Audrey Chung</b> Systems Design Engineering “Extracting heart rate from ambient smartphone cameras”	Jan–Apr 2014
<b>Eura Cho, Sara Greenberg, Sharon Leung, Michelle Pugne, Emily Sim</b> Systems Design Engineering 2013 “Real-time parking lot computer vision analytics platform”	Jan–Apr 2013

## PROFESSIONAL ACTIVITIES

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### 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** 1st International Workshop on Computer Vision for Physiological Measurement (part of Conference on Computer Vision and Pattern Recognition) 2017–2018

## SERVICE ACTIVITIES

**Conference Organizing Committee** Cerebral Hypoperfusion Summit Apr 2018

**Science Fair Judge** Centennial Public School Apr 2018

**Conference Organizing Committee** 3rd Annual Conference on Vision and Imaging Systems Oct 2017

**Engineering Design Project Judge** UWaterloo Software Engineering Capstone Design Symposium Mar 2017

**Conference Coordinator** 2nd Annual Conference on Vision and Imaging Systems Oct 2016

**Computer Vision Elementary School Outreach Coordinator** KW Bilingual School Dec 2015

**Conference Coordinator** 1st Annual Conference on Vision and Imaging Systems Oct 2015

**Engineering Design Project Judge** UWaterloo Engineering Design Project Symposium Nov 2014

**Conference Organizing Committee** International Society for Gravitational Physiology Aging in Space Symposium Jun 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

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### JOURNAL REFEREEING

OSA Biomedical Optics Express  
Journal of Biomedical Optics  
IEEE Transactions on Biomedical Engineering  
IEEE Transactions on Medical Imaging  
IEEE Transactions on Emerging Topics in Computational Intelligence  
IEEE Access  
Computer Methods and Programs in Biomedicine  
American Journal of Physiology Heart and Circulatory Physiology  
Scientific Reports (Nature Publishing Group)

### CONFERENCE REFEREEING

Conference on Computer Vision and Pattern Recognition	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

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Hockey goaltending  
Coppersmithing  
Alto saxophone and electric guitar  
Reading