

ANDREA CURATOLO

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EDUCATION

- The University of Western Australia** Perth, Australia
 - Doctor of Philosophy (PhD), Optical Engineering March 2017
 - [Optical + Biomedical Engineering Laboratory](#)
 - Dissertation Topic: Characterising and improving image quality in optical coherence tomography and elastography by means of optical beam shaping and simulations

- Politecnico di Milano** Milan, Italy
 - Master of Science, Physics Engineering (Photonics) December 2006
 - [Department of Physics](#)
 - Dissertation Topic: Development of a diagnostic fluorescence and reflectance multispectral imaging system for artworks
 - GPA: 106/110

- Lunds Universitet** Lund, Sweden
 - Socrates-Erasmus Study Abroad Program August 2004 - June 2005

- Politecnico di Milano** Milan, Italy
 - Bachelor of Science, Physics Engineering (Nanotechnology) July 2004
 - [Department of Physics](#)
 - GPA: 108/110

EMPLOYMENT EXPERIENCE

- Visual Optics and Biophotonics Laboratory** Consejo Superior de
Instituto de Óptica Investigaciones Científicas
Marie Skłodowska-Curie Cofund Research Fellow Madrid, Spain
Nov 2017 – Present
 - *System engineering:* 1) coordinating development of a corneal stiffness measuring device, using non-contact mechanical loading, dynamic imaging, numerical fluid-dynamics and mechanical simulations and inverse problem solution through optimization algorithms; 2) supervising the development of an automated calibration and correction system for OCT field distortion; 3) contributing to the design, miniaturization, testing, IP protection and commercialization pathway for a stiffness-related corneal pathology screening device.
 - *Optical engineering:* lead design and development of: 1) a fast corneal deformation imaging system on multiple meridians using optical coherence tomography – OCT; 2) a phase-sensitive OCT vibrometer; 3) a precise ocular biometer and full anterior eye segment 3D imaging system, using swept source OCT; 4) an OCT-integrated ocular aberrometer, with configurable vision stimulus, variable accommodation demand (through a Badal optometer) and a testbed for pupil projection of vision correction solutions (e.g. multifocal lenses).
 - *Hardware engineering:* Lead selection, procurement, and testing of optimal hardware for the projects.
 - *Software engineering:* Implementation of the system control and acquisition software. Implementation of the signal and image processing software.
 - *Ethics, Governance and Quality control:* involvement in non-interventional study protocol definition and Ethics and IRB applications. Procedure, protocol and progress report writing. Software development through source control. Hardware

database implementation.

- *Multi-stakeholder projects*: Participation in several meetings and in reporting for a European Commission H2020 Innovation Action.
- *Public and private funding*: Application for state and European grants and conducting meetings with Industry for potential contract research.

**Bioimaging Research and Innovation
for Translational Engineering Laboratory**

Research Fellow

- *System engineering*: lead design and integration of a compact portable OCT system for ophthalmic applications in remote areas through telemedicine.
- *Optical engineering*: development of handheld and wearable optical probes and imaging protocols for the clinical translation of optical elastography: an imaging technique that provides a map of the mechanical properties of tissue.
- *Commercialization*: contract research for a medical startup developing optical elastography for tumour margin assessment in breast-conserving surgery. Lead the technical team in determining and improving the technique's diagnostic accuracy (positive and negative predictive powers) and integrating the technology into the surgical workflow.
- *Project management*: project and resource management through scheduling (Gantt charts), budgeting, delegating and reporting.
- *Organizational awareness and quality control*: involvement in procedure, protocol and progress report writing, with a focus on IP documentation and protection (patenting). Software development through source control. Hardware database implementation.
- *Research infrastructure*: Selection and procurement of laboratory equipment and big data processing facilities.

The Harry Perkins Institute of
Medical Research, Perth, Australia

July 2016 – Oct 2017

Optical + Biomedical Engineering Laboratory

Research Associate

- *Optical engineering*: design and assembly of optical imaging systems (OCT scanners and microscopes both in laboratory bench-top and portable setups), including lasers, mirrors, lenses, gratings, filters, spatial light modulators, galvanometer scanning systems, polarization optics and fiber optics.
- *Metrology*: diagnostic image quality benchmarking, tissue optics analysis and tissue-mimicking phantom development.
- *Opto-mechanics and sensors*: multimodal imaging probe development (OCT + Ultrasound imaging) and integration of magnetic 3D tracking sensor in endoscopic fiber optic probe.
- *Image processing and 3D visualization*: image segmentation and co-registration algorithm development and digital signal processing for 3D image reconstruction.
- *Field service engineering*: diagnostic imaging equipment supervision and data acquisition during clinical medical trials. Technology development and prototyping from clinical feedback.

University of Western Australia

May 2008 - March 2012

Compressors Controls Corporation

System Engineer

- *Control engineering*: design and testing of company produced control systems for compressors and other turbo-machinery.
- *Customer and company teams liaison*: define a control strategy, accomplish system specification, develop the engineering documentation.

Milan, Italy; Des Moines, USA

May 2007 - April 2008

- *Hardware engineering*: calculations of thermodynamics control space variables; electrical, mechanical and power dimensioning of the control system panel; and definition of system I/O.

TEACHING EXPERIENCE

- **School of Electrical, Electronic and Computer Engineering** University of Western Australia
Laboratory demonstrator March 2015 - May 2016
- Teaching and demonstrating for the Electronic material and devices unit to 3rd year engineering undergraduates.

SUPERVISORY EXPERIENCE

- **PhD thesis**
- Geethika Muralidharan, OCT developments for the understanding of the crystalline lens and myopia Universidad Complutense Madrid September 2018 - September 2021
- Rowan W. Sanderson, Development of a novel palpation-mimicking probe for optical coherence elastography University of Western Australia August 2017 - August 2020
- **Master's and Bachelor's thesis**
- Noel Basalo Lourido, Development of a dynamic calibration method for quantitative OCT Universidad Complutense Madrid March 2019 - September 2019
- Brooke Krajancich, Correcting for motion artifact in handheld optical imaging probes for use in breast-conserving surgery University of Western Australia March 2017 - November 2017
- Luke Frewer, Novel probes utilising optical coherence elastography as an intraoperative margin assessment tool to reduce re-excision rates in breast-conserving surgery University of Western Australia May 2016 - May 2017
- Rowan W. Sanderson, Smart Surgical Glove: Freehand 2D Elasticity Imaging for the Delineation of Breast Cancer Tumor Margins University of Western Australia May 2016 - May 2017

RESEARCH EXPERIENCE

- **Focus** October 2009 - Present
- *Areas*: Optical coherence tomography, optical elastography, miniaturized and endoscopic probes, image quality improvement in turbid tissue; phantom design, speckle phenomena study and noise mitigation, light propagation in tissue and image simulation.
- *Applications*: Biomedical: ophthalmology (corneal biomechanics, ocular biometry, vision science), breast cancer (margin detection), mechano-biology (cell mechanics), airway imaging.
- *Collaborators' network*: Institute of Physical Chemistry (Poland), Instituto oftalmologico Fernandez Vega (Spain), University of Liverpool (UK), National university of Ireland (Ireland), Harvard Medical School (USA), Massachusetts Institute of Technology (USA), Lions Eye Institute (Australia), UWA School of Surgery (Australia), Royal Perth, QEII, Fiona Stanley Hospital (Australia).

- **Publications** October 2009 - Present
- Peer reviewed journal articles: **28**; Book chapters: **1**; Invited talks: **3**
- Citation: 1200 (Google Scholar); **h-index: 18**

- B. Lau, R.A. McLaughlin, **A. Curatolo**, R.W. Kirk, D.K. Gerstmann, and D.D. Sampson, "Imaging true 3D endoscopic anatomy by incorporating magnetic tracking with optical coherence tomography: proof-of-principle for airways," *Opt. Express* **18**, 27173-27180 (2010).
- **A. Curatolo**, B. F. Kennedy, D. D. Sampson, "Structured three-dimensional optical phantom for optical coherence tomography," *Opt. express* **19**, 19480-19485 (2011).
- R. A. McLaughlin, B. C. Quirk, **A. Curatolo**, R. W. Kirk, L. Scolaro, D. Lorensen, P. D. Robbins, B. A. Wood, C. M. Saunders,

and D. D. Sampson, "Imaging of Breast Cancer With Optical Coherence Tomography Needle Probes: Feasibility and Initial Results," *IEEE Journal of Selected Topics in Quantum Electronics* **18**, 1184-1191 (2012).

- **A. Curatolo**, R. A. McLaughlin, B. C. Quirk, R. W. Kirk, A. G. Bourke, B. A. Wood, P. D. Robbins, C. M. Saunders, and D. D. Sampson, "Ultrasound-Guided Optical Coherence Tomography Needle Probe for the Assessment of Breast Cancer Tumor Margins," *American Journal of Roentgenology* **199**, W520-W522 (2012).
- G. Lamouche, B. F. Kennedy, K. M. Kennedy, C.-E. Bisailon, **A. Curatolo**, G. Campbell, V. Pazos, and D. D. Sampson, "Review of tissue simulating phantoms with controllable optical, mechanical and structural properties for use in optical coherence tomography," *Biomed. Opt. Express* **3**, 1381-1398 (2012).
- D. Lorensen, C. C. Singe, **A. Curatolo**, and D. D. Sampson, "Energy-efficient low-Fresnel-number Bessel beams and their application in optical coherence tomography," *Optics Letters* **39**, 548-551 (2014).
- B. F. Kennedy, R. A. McLaughlin, K. M. Kennedy, L. Chin, **A. Curatolo**, A. Tien, B. Latham, C. M. Saunders, and D. D. Sampson, "Optical coherence micro-elastography: mechanical-contrast imaging of tissue microstructure," *Biomed. Opt. Express* **5**, 2113-2124 (2014).
- L. Chin, **A. Curatolo**, B. F. Kennedy, B. J. Doyle, P. R. T. Munro, R. A. McLaughlin, and D. D. Sampson, "Analysis of image formation in optical coherence elastography using a multiphysics approach," *Biomed. Opt. Express* **5**, 2913-2930 (2014).
- P. R. T. Munro, **A. Curatolo**, and D. D. Sampson, "Full wave model of image formation in optical coherence tomography applicable to general samples," *Opt. Express* **23**, 2541-2556 (2015).
- **A. Curatolo**, P. R. T. Munro, D. Lorensen, P. Sreeksumar, C. C. Singe, B. F. Kennedy, and D. D. Sampson, "Quantifying the influence of Bessel beams on image quality in optical coherence tomography," *Scientific Reports* **6**, 23483 (2016).
- **A. Curatolo**, M. Villiger, D. Lorensen, P. Wijesinghe, A. Fritz, B. F. Kennedy, and D. D. Sampson, "Ultrahigh-resolution optical coherence elastography," *Opt. Letters* **41**, 21-24 (2016).
- B. Krajancich, **A. Curatolo**, Q. Fang, R. Zilkens, B.F. Dessauvage, C.M. Saunders, and B.F. Kennedy, "Handheld optical palpation of turbid tissue with motion-artifact correction," *Biomed. Opt. Express* **10**, 226-241 (2019).
- R.W. Sanderson, **A. Curatolo**, P. Wijesinghe, L. Chin, and B.F. Kennedy, "Finger-mounted quantitative micro-elastography," *Biomed. Opt. Express* **10**, 1760-1773 (2019).
- A full list of my publications can be found [here](#)

FUNDING, GRANTS AND FELLOWSHIP

- | | |
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| <ul style="list-style-type: none"> ■ Industry collaboration doctoral funding grant
<i>Autonomous Region of Madrid Government</i>
150,000 € funding for hiring a PhD student, technical support, equipment, consumable, publication, IP, and travel costs for three years for an industry sponsored doctoral program. | <p>Consejo Superior de Investigaciones Científicas & 2Eyes Vision, SL
Madrid, Spain
February 2020 – January 2023</p> |
| <ul style="list-style-type: none"> ■ Juan de la Cierva-Formacion Fellowship
<i>Spanish Science, Innovation and University Ministry</i>
50,000 € talent promotion and employment program
Highly competitive fellowship: 225 fellowship/year in all HDR fields | <p>Consejo Superior de Investigaciones Científicas
Madrid, Spain
May 2020 – April 2022</p> |
| <ul style="list-style-type: none"> ■ Marie Skłodowska-Curie Research Fellowship
<i>EU-commission COFUND Multiply project</i> | <p>Consejo Superior de Investigaciones Científicas</p> |

- 159,000 € cofunded fellowship for career development of the next generation of photonics research and innovation leaders. Madrid, Spain
May 2018 – April 2020
- **Ad-hoc top-up scholarship**
Optical+Biomedical Engineering Laboratory
40,365 € extra funding towards a living stipend. University of Western Australia
March 2012 – September 2016
- **Australian Postgraduate Award**
Australian Government Scholarships funding scheme
63,700 € funding towards a living stipend for postgraduate studies. University of Western Australia
March 2012 – September 2016

AWARDS AND ACHIEVEMENTS

- **2018 OSA Young Investigator prize**
Sedoptica, OSA
Award for best presentation by a young researcher in the Vision Symposium at the XII Reunión Nacional de Óptica. Castellón, Spain
July 2018
- **Newport Research Excellence award**
SPIE, Newport
Funding to travel to San Francisco to present my research at SPIE Photonics West 2016, the leading conference in biomedical optics. San Francisco, USA
January 2016

LEADERSHIP AND PROFESSIONAL DEVELOPMENT

- [*UWA Student chapter of The Optical Society \(OSA\)*](#): President (May 2015 – September 2016)
- *The Optical Society (OSA)*: member (December 2012 – present)
- *The International Society of Optics And Photonics (SPIE)*: Member (December 2012 – present)

INTELLECTUAL PROPERTY

- Patent application: *AU 2017904109*
Priority date: 11/10/2017
Patent title: *A method of volumetric imaging of a sample*
Inventors: Andrea Curatolo; Brooke Krajancich; Brendan Kennedy; Qi Fang
Owner: The University of Western Australia
Licensee: OncoRes Medical, ltd.

TECHNICAL SKILLS AND CERTIFICATIONS

- *Computer*: Experienced: MATLAB, Microsoft Office, ImageJ, Volview, CorelDraw; Intermediate: Zemax, Solidworks, Labview, Git source control; Basic: Abaqus, Cura 3D printing.
- *Equipment*: Expertise in laboratory measurement devices (oscilloscopes, optical and electrical spectrum analyzers, optical power meters, multimeters), optical equipment and fiber optics and micro-optics handling and assembling devices (cleaver, splicer, polisher). Knowledge of bio-laboratory equipment: precision scales, pipettes, chemicals storage, vacuum systems, biological safety cabinets.
- *Certificate of Professional Engineer (Skill Level 1)*: ANZSCO Classification: 233913 Biomedical engineer from Engineers Australia.
- *Language proficiency test*: English IELTS overall band score: 8.5 / 9 (10th July 2010). Italian: native Spanish: intermediate.
- *Driver's license*: Italian driver's Licence (Class B), Australian driver's licence (Class C).

SOFT SKILLS AND COMMUNITY INVOLVMENT

- *Charity organization*: Board member of Hope, Act, Change, Inc., Western Australia (2013 – 2017)
- *Student support organization*: Secretary of Erasmus Student Network - Politecnico di Milano branch (October 2005 – May 2007).
- Highly analytical independent thinker, team player, accustomed to multi-disciplinary and multi-cultural work environments, focused, reliable, upfront in issue and conflict resolution, good communicator.
- Passionate about photography, videography, nature, human achievements, diversity and cultures, languages, travel, sports, beach and all things geek: Virtual and Augmented Reality, 360° videos, quadcopter drones, hyperlapse photography.