

# Ramona De Luca

## PROFILE

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**Licensed Industrial Engineer**, 31, **PhD** in Industrial Production Engineering in April 2015.

Thanks to my PhD project and my work experience, I have developed a strong know-how in the area of medical imaging, in particular in the field of ultrasound imaging systems. My specialism is heterogeneous and goes from designing and building experimental set-up to signal processing and computational modelling.

I wish to work in the forefront of the research and development of innovative and efficient systems contributing to a real progress in the field of medical devices. I am very passionate about my job and I like to be involved in challenging works. I have the patience and the persistence to carry on when I don't get the expected results and I have both the ability to manage projects by myself and the ability to work in team.

## RESEARCH and WORK EXPERIENCE

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**Holder of the FIRC (Fondazione Italiana per la Ricerca sul Cancro) fellowship at The Institute of Cancer Research & Royal Marsden Hospital, Department of Physics, Ultrasound and Optics Team, London (UK)**

**June 2014 - May 2015**

### **Project topic**

Characterization of artefacts in ultrasound shear wave elastography for improved breast cancer assessment

**PhD in Industrial Production Engineering**

**Sapienza University of Rome (Italy), Mechanical and Aerospace Engineering Department, Biomedical Instrumentation Team**

**2011-2015**

### **PhD project**

The overall aim of my PhD project was to use the finite element analysis to validate, optimize and control three different and innovative applications of medical ultrasound for breast cancer screening and diagnosis:

1. Characterization of the acoustic scattering of elastic targets mimicking breast microcalcifications.
2. Modelling shear waves propagation, generated by either an acoustic radiation force impulse or the supersonic emission sequence of the Aixplorer® (SuperSonic Imagine, France).
3. Understanding the nature of waves propagating within a thin layer mimicking a three-dimensional cell culture glued to the dish and development of a reliable algorithm for the estimation of the transverse waves speed.

### **Further activities**

I have been involved in the research project dealing with the finite element analysis of the biomechanics of human hip joint for the early diagnosis of osteoporosis and osteoarthritis.

I have worked also on the reconstruction of sound speed and attenuation maps and compound image of tissue-mimicking phantoms scanned using a dedicated experimental set-up for the ultrasound computed tomography.

I have also supervised students from Biomedical Engineering School.

**Visiting worker at The Institute of Cancer Research & Royal Marsden Hospital, Department of Physics, Ultrasound and Optics Team, London (UK)**

**July 2012 - December 2012 & March 2013 - July 2013**

### **Main activities**

The aim has been twofold: 1. Finite element analysis of propagation of shear waves in soft tissues, generated through an acoustic radiation force impulse; 2. Finite element analysis of transverse wave propagating within soft tissues with a plate-like geometry in order to explore the potential to provide a microelastography tool.

### **Further activities**

I have led seminars, conducted laboratory demonstrations and supervised students from Biomedical Engineering and Physics Schools.

### **Co-worker of the Biomedical Instrumentation Team, Mechanical and Thermal Measurements Laboratory, Faculty of Engineering, Sapienza University of Rome (Italy)**

**2007 - 2009**

### **Main activities**

Design and development of the ultrasound computed tomography set-up in reflection mode modality for the characterization of tissue-mimicking phantoms.

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## **EDUCATION**

### **Master of Science, Biomedical Engineering, GPA 110/110 with honours Sapienza University of Rome (Italy), 2007-2010.**

#### **Thesis topic**

Finite element analysis of ultrasound scattering of elastic targets immersed in water.

### **Bachelor of Science, Clinical Engineering, GPA 110/110 with honours Sapienza University of Rome (Italy), 2003-2006.**

#### **Thesis topic**

Characterization of breast microcalcifications under medical ultrasound.

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## **CONTINUING EDUCATION and AWARDS**

### **License**

Professional Engineer license for the Industrial Engineering sector, Sapienza University of Rome (Italy), 2014

### **Courses attended**

The 2015 Bagrit Lecture by Dr Mina J. Bissell, Imperial College London (UK), 18 May 2015. Topic: "Why don't we get more cancer?".

Python Introduction Course, The Institute of Cancer Research, London (UK), 12-14 May 2015

Comsol minicourses and tutorial, European Comsol Conference 2013, Rotterdam (Netherlands)

The 2013 Oxford Institute of Biomedical Engineering Distinguished Lecture Seminar by Professor Mathias Fink, University of Oxford, 23 May 2013. Topic: "Biomedical applications of ultrasonic time-reversal: from cancer detection to functional imaging".

Marc/Mentat training course, 19-22 October 2012, Frimley (UK)

Seminar on therapeutic and diagnostic ultrasound at the UCL Centre for Neuroimaging Techniques, London, 28 June 2012. Topic: "Brain Ultrasound for Structural and Functional Imaging and Therapy". Speaker: Dr Mickael Tanter, ESPCI ParisTech, France.

LabVIEW Core 1 and Core 2 - National Instruments, 7-11 May 2012, Rome (Italy)

Comsol minicourses and tutorial, European Comsol Conference 2009, Milan (Italy)

### **Award**

FIRC (Fondazione Italiana per la Ricerca sul Cancro) Fellowship for abroad 2013

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## **INTERESTS and SKILLS**

### **Further technical skills**

Extensive knowledge of Comsol Multiphysics, Marc/Mentat, Matlab, MS Office suite; moderate knowledge of SolidWorks, LabVIEW, Python and C.

Design and development of experimental set-up with a focus on the characterization of soft tissues through ultrasonic backscatter; processing of biomedical signals and bio-images; computational biomedical engineering;

drawing up research proposal and applying for funding.

### Personal skills

Public speaking capacity and audience involvement; team working and leadership; problem solving spirit mainly due to technical and practical issues encountered, and fixed, during my PhD.

Listening ability, frankness, multi-tasking, spirit of collaboration.

Full clean driving licence.

### Languages

Italian: native speaker.

English: B2 speaking, listening, writing and reading.

French: basic.

## PUBLICATIONS

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### Journal

Franco Marinozzi, Fabiano Bini, Annalisa De Paolis, **Ramona De Luca**, Andrea Marinozzi, *Effects of the Hip Osteoarthritis on Mechanical Stimulation of Trabecular Bone: a Finite Element Study*, J. Med. Biol. Eng. 2015

### Presentations

**Ramona De Luca**, Jérémie Fromageau, Franco Marinozzi, Jeffrey Bamber, *Characterization of artefacts in shear wave elastography for improved breast cancer assessment*, International Tissue Elasticity Conference, 21-24 September 2015, Verona (Italy)

**Ramona De Luca**, Jérémie Fromageau, Elí Elyas, Franco Marinozzi, Jeffrey Bamber, *Finite element analysis of shear wave propagation in soft media with plate-like geometry in a rigid container*, International Tissue Elasticity Conference, 1-4 October 2013, Lingfield Park (UK)

### Conference proceeding

F. Marinozzi, A. De Paolis, **R. De Luca**, F. Bini, R. Bedini, A. Marinozzi, *Stress and strain patterns in normal and osteoarthritic femur using finite element analysis*, Computational Modelling of Objects Represented in Images: Fundamentals, Methods and Applications III, 2012 CRC Press, Taylor & Francis Group

### Poster

**R. De Luca**, J. Fromageau, H. W. Chan, F. Marinozzi, J. Bamber, *A finite element model of shear wave propagation induced by an acoustic radiation force impulse*, European Comsol Conference, 23-25 October 2013, Rotterdam (NL)

31<sup>st</sup> August 2015

Ramona De Luca



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