

# Miguel Ángel Lago Ángel, Ph.D.

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## Contact Information

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## Research Interests

During my PhD I developed a methodology for the in-vivo characterization of the bio-mechanical behavior of the breast using medical images. This estimation was performed using a search algorithm which optimizes the elastic constants of the constitutive models of the breast tissues. The search is based on the iterative variation of these parameters in order to increase the similarity between a simulated deformation of the organ and the real one. The methodology is based on the simulation of the compression of the breast during an MRI-guided biopsy. This research was conducted in collaboration with a leading research group developing simulations of breast anatomy, the X-ray Physics Laboratory at the University of Pennsylvania.

I moved to University of California, Santa Barbara (UCSB) after finishing my PhD to work on image quality assessment. At UCSB I have studied how humans explore 3D volumes such as Magnetic Resonance Images (MRI) or Digital Breast Tomosynthesis (DBT) by using an infra-red video eye tracker. I developed a new model observer that processes the entire image with varying spatial resolution depending on fixation location (foveated visual processing). The model incorporates eye movement models and 3D scrolls (for 3D images) to predict human performance when reading volumetric images across signal types, unlike standard model observers such as the Channelized Hotelling or Non-prewhitening model.

This new model observer can be used to get an estimation of the image quality for complex 3D search tasks and, ultimately, to improve medical image acquisition and display.

## Experience

2016 - now Postdoctoral Researcher at Vision and Image Understanding Lab, [University of California, Santa Barbara](#)

- Development of foveated visual model observers to assess image quality in 3D Digital Breast Tomosynthesis.
- Supervision of Prof. Miguel P. Eckstein and Dr. Craig K. Abbey

2015 - 2016 Research Engineer at [Universitat Politècnica de València](#)

2012 - 2013 Visiting scholar at [University of Pennsylvania](#)

- Department of Radiology: X-ray Physics Lab
- Supervision of Dr. Andrew D. Maidment and Dr. Predrag R. Bakic

2009 - 2014 PhD Student at [Universitat Politècnica de València](#)

- Thesis Topic: A new approach for the in-vivo characterization of the biomechanical behavior of the breast and the cornea

2009 Internship at SETIVAL

- Development of software for mobile devices and interactive television

2009 Internship at Tissat

- Software developer for mobile devices
- [Press Release](#)

## Education

**Universitat Politècnica de València**, Valencia, Spain

2014 PhD. in Computer Engineering

- Thesis Topic: A new approach for the in-vivo characterization of the biomechanical behavior of the breast and the cornea
- Advisors: Prof. Dr. Carlos Monserrat Aranda and Dr. María José Rupérez Moreno
- Qualification: Excellent Cum Laude
- [Download link](#)

2011 Master Degree in Artificial Intelligence, Pattern Recognition and Digital Imaging

- Thesis Topic: Volume Comparison: application to the analysis of the behavior of biomechanical models of organs
- Advisor: Prof. Dr. Carlos Monserrat Aranda

2009 Computer Engineer

- Best student record award
- Specialization in Industrial Engineering

## Journal Publications

**Miguel A. Lago**, Ioannis Sechopoulos, François O. Bochud, Miguel P. Eckstein, "Measurement of the useful field of view for single slices of different imaging modalities and targets," J. Med. Imag. 7(2) 022411 (2020) [\[Link\]](#)

**Miguel A. Lago**, María José Rupérez, Carlos Monserrat, Francisco Martínez-Martínez, Sandra Martínez-Sanchis, Elena Larra, María Ángeles Díez-Ajenjo and Cristina Peris-Martínez. "Patient-specific simulation of the intrastromal ring segment implantation in corneas with keratoconus". J. Mech. Behav. Biomed. (2015) [\[Link\]](#)

**Miguel A. Lago**, María José Rupérez, Francisco Martínez-Martínez, Sandra Martínez-Sanchis, Predrag R. Bakic, and Carlos Monserrat. "Methodology based on genetic heuristics for in-vivo characterizing the patient-specific biomechanical behavior of the breast tissues". Expert Syst. Appl. (2015) [\[Link\]](#)

**Miguel A. Lago**, María José Rupérez, Francisco Martínez-Martínez, Carlos Monserrat, Elena Larra, José Luis Güell and Cristina Peris-Martínez. "A new methodology to in-vivo estimate the elastic constants that characterize the patient-specific biomechanical behavior of the human cornea". J. Biomech. (2015) [\[Link\]](#)

Francisco Martínez-Martínez, **Miguel A. Lago**, María José Rupérez and Carlos Monserrat. "Analysis of several biomechanical models for the simulation of lamb liver behaviour using similarity coefficients from Medical Image". Comput. Method. Biomec. (2013) [\[Link\]](#)

Francisco Martínez-Martínez, María José Rupérez, José D. Martín-Guerrero, Carlos Monserrat, **Miguel A. Lago**, Eugenia Pareja, Sara Brugger and Rafael López-Andújar. "Estimation of the elastic parameters of human liver biomechanical

models by means of medical images and evolutionary computation". *Comput. Meth. Prog. Bio.* (2013) [\[Link\]](#)

## Conferences

**Miguel A. Lago**, Bruno Barufaldi, Predrag R. Bakic, Craig K. Abbey, Andrew D. Maidment, and Miguel P. Eckstein, Foveated Model Observer to Predict Human Search Performance on Virtual Digital Breast Tomosynthesis Phantoms. In *Proc. SPIE, Medical Imaging*, 2020. [\[Link\]](#)

Aditya Jonnalagadda, **Miguel A. Lago**, Bruno Barufaldi, Predrag R. Bakic, Craig K. Abbey, Andrew D. Maidment and Miguel P. Eckstein, Evaluation of Convolutional Neural Networks for Search in  $1/f^{2.8}$  Filtered Noise and Digital Breast Tomosynthesis Phantoms. In *Proc. SPIE, Medical Imaging*, 2020. [\[Link\]](#)  
This paper obtained an honorable mention student poster.

**Miguel A. Lago**, Craig K. Abbey, Miguel P. Eckstein, A foveated channelized Hotelling search model predicts dissociations in human performance in 2D and 3D images. In *Proc. SPIE, Medical Imaging*, 2019. [\[Link\]](#)

**Miguel A. Lago**, Craig K. Abbey, Bruno Barufaldi, Predrag R. Bakic, Susan P. Weinstein, Andrew D. Maidment, Miguel P. Eckstein, Interactions of lesion detectability and size across single-slice DBT and 3D DBT. In *Proc. SPIE, Medical Imaging*, 2018. [\[Link\]](#)

Craig K. Abbey, **Miguel A. Lago**, Miguel P. Eckstein, Observer templates in 2D and 3D localization tasks In *Proc. SPIE, Medical Imaging*, 2018. [\[Link\]](#)

Miguel P. Eckstein, **Miguel A. Lago**, Craig K. Abbey, Evaluation of search strategies for microcalcifications and masses in 3D images. In *Proc. SPIE, Medical Imaging*, 2018. [\[Link\]](#)

Bruno Barufaldi, Predrag R. Bakic, David D. Pokrajac, **Miguel A. Lago**, Andrew D. Maidment, Developing populations of software breast phantoms for virtual clinical trials. In *Proc. of International Workshop on Breast Imaging (IWBI 2018)*, 2018. [\[Link\]](#)

María J. Rupérez, Francisco Martínez-Martínez, Marcelino Martínez-Sober, **Miguel A. Lago**, Delia Lorente, Predrag R. Bakic, Antonio J. Serrano-López, Sandra Martínez-Sanchis, Carlos Monserrat, Martín-Guerrero J. D., Modeling the Mechanical Behavior of the Breast Tissues Under Compression in Real Time. In *VipIMAGE 2017. ECCOMAS 2017*, 2017. [\[Link\]](#)

**Miguel A. Lago**, Craig K. Abbey, Miguel P. Eckstein, Foveated model observers to predict human performance in 3D images. In *Proc. SPIE, Medical Imaging*, 2017. [\[Link\]](#)

Eckstein, M. P., **Miguel A. Lago**, Craig K. Abbey, The role of extra-foveal processing in 3D imaging. In *Proc. SPIE, Medical Imaging*, 2017. [\[Link\]](#)

**Miguel A. Lago**, María J. Rupérez, Francisco Martínez-Martínez and Carlos Monserrat, Genetic algorithms for estimating the biomechanical behavior of breast tissues. In *Proceedings of IEEE-EMBS International Conferences on Biomedical and Health Informatics 2014 (BHI)*, pages 760-763.  
This paper obtained the 3rd best student oral communication award.

Predrag R. Bakic, Andrew D. Maidment, Joseph H. Chui, Ali N. Avanaki, Cedric Marchessoux, David D. Pokrajac, Kathryn S. Espig, Tom Kimpe, Albert Xthona, **Miguel A. Lago** and Shankla, V., Automated and optimized imaging simulation platform for virtual clinical trials of breast cancer screening. In *Proceedings of the 99th Scientific Assembly and Annual Meeting 2013 (RSNA)*

Andrew D. Maidment, Predrag R. Bakic, Joseph H. Chui, Ali N. Avanaki, Cedric Marchessoux, David D. Pokrajac, Kathryn S. Espig, Tom Kimpe, Albert Xthona, **Miguel A. Logo** and Shankla, V., The role of virtual clinical trials in preclinical testing of breast imaging systems. In Proceedings of the 99th Scientific Assembly and Annual Meeting 2013 (RSNA)

**Miguel A. Logo**, Andrew D. Maidment and Predrag R. Bakic, Modeling of mammographic compression of anthropomorphic software breast phantom using FEBio. In Proceedings of International Symposium of Computer Methods in Biomechanics and Biomedical Engineering 2013 (CMBBE), pages 495-496. This paper obtained the 3rd best student poster award.

**Miguel A. Logo**, Francisco Martínez-Martínez, María J. Rupérez, Carlos Monserrat and Mariano Alcañiz, A study about coefficients to estimate the error in biomechanical models used to virtually simulate the organ behaviors. In Medicine meets Virtual Reality (MMVR19), 2012. ISBN 978-1-61499-021-5.

**Miguel A. Logo**, Francisco Martínez-Martínez, María J. Rupérez, Carlos Monserrat and Mariano Alcañiz, Breast Prone-To-Supine Deformation and Registration Using a Time-Of-Flight Camera. In proceedings of BIOROB 2012, Rome. ISBN: 978-1-4577-1198-5.

Francisco Martínez-Martínez, **Miguel A. Logo**, María J. Rupérez, Carlos Monserrat, Eugenia Pareja, Miriam Cortés, Rafael López and Sara Brugger, A computational method to estimate the elastic parameters of biomechanical models for the in-vivo human liver. In proceedings of CMBBE 2012, Berlin.

Fernando López-Mir, Francisco Martínez-Martínez, Juan J. Fuertes, **Miguel A. Logo**, María J. Rupérez, Valeriana Naranjo and Carlos Monserrat, NaRALap: augmented reality system for navigation in laparoscopic surgery. In Computer Assisted Radiology and Surgery (CARS), 2011. [\[Link\]](#)

## Honors

- 2014 Student Oral Communication Award, IEEE-EMBS International Conferences on Biomedical and Health Informatics, Valencia, Spain
- 2013 Student Poster Award, The 11th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering, Salt Lake City, UT
- 2012 TEE Erasmus Mundus Scholarship
- 2010 Doctoral Scholarship of Spanish Ministry of Education
- 2009 Best Student Record Award of the Promotion
- 2006 Second category award in Data Structures and Algorithms course

## Other Skills

**Programming Languages:** Matlab, Python, PHP, C, C++, Java, JavaScript  
**Others:** HTML, SQL, CSS, L<sup>A</sup>T<sub>E</sub>X  
**Coursera:** Machine Learning, Data Science