Márcia Raquel da Silva e Sousa Vagos

Curriculum Vitae

Contact information

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Key qualifications

- Computational modelling and simulation of dynamical systems (eg. cellular physiology);
- Utilizing numerical solvers of large systems of differential equations;
- Designing and setting up simulations in local and remote servers;
- Interpretation and visualization of simulated data;
- Exploratory data analysis, statistical modeling, and feature extraction;
- Uncertainty quantification of models, and sensitivity analysis methods;
- 3-dimensional modeling with Hypermesh (designing geometries and meshes);
- Thermal simulation with Ansys Fluent;
- Using the image analysis toolbox in Matlab;
- Expertise in cardiac electrophysiology;
- Broad knowledge of health sciences, cellular and molecular biology, physiology, physics, chemistry, and electronics;

Education

2016 — 2020 **Doctoral Degree**
Simula Research Laboratory; University of Oslo, Department of Informatics

Marie Curie Early Stage Researcher Fellowship within the Afib-TrainNet project (H2020).

2008 - 2013 **Integrated Masters Degree**
Faculty of Engineering of the University of Porto; The Abel Salazar Biomedical Sciences Institute

Professional experience

Mar 2016 -Sep 2020
Full time
40 hr/week

Doctoral dissertation — Simula Research Laboratory

"A computational study of Atrial Fibrillation mechanisms at the cardiomyocyte level"

- Developed and implemented computational models of cardiac cellular electrophysiology under health and diseased states;
- Performed simulation using numerical solvers in computer clusters;
- Applied methods for uncertainty quantification, parameter sensitivity analysis, and data assimilation.
- Developed algorithms and routines for data model analysis, feature extraction, and data visualization.

Aug - Dec 2017
Full time
40 hr/week

Research stay during doctoral studies — Maastricht University, The Netherlands

- Development of a novel model of the rabbit atrial myocyte to study the mechanisms of calcium silencing.

Feb 2014 - Jul 2015
Full time
40 hr/week

Research assistantship — Forschungszentrum Informatik, Germany

- Developed a novel 3D model of the human eye based on the finite difference method;
- Performed simulations of thermal damage in the retina caused by laser interaction;
- Carried out experimental measurements of retinal damage caused by a laser using optical setups and explanted pig eye tissue.

Jan - Jul 2013
Full time
40 hr/week

Master thesis — Faculty of Engineering, University of Porto, Portugal

"Evaluation of bacterial adhesion on carbon nanotube-PDMS composite materials"

- Developed novel carbon nanotube-polymer composite coatings;
- Characterized the chemical, physical, and biological material properties using a variety of experimental techniques.
- Studied the effect of carbon nanotube incorporation and chemical functionalization in poly-(dimethylsiloxane) on the amount and rate of *E. coli* adhesion using flow cells.

Feb - Jul 2012

Erasmus Semester — Department of Computer Science, Aalto University, Finland

- Analysed fMRI datasets with activation patterns of the human brain subjected to stimuli;
- Performed data analysis with independent principal component analysis. to achieve temporal decorrelation of brain activation patterns during visual and auditory stimuli.

Scientific publications

MR Vagos, J Heijman, H Arevalo, U Schotten, J Sundnes, "A computational study of the mechanisms of abnormal calcium wave propagation in atrial myocytes" (in preparation).

MR Vagos, J Heijman, H Arevalo, U Schotten, J Sundnes**,** "A novel computational model of the rabbit atrial cell with spatial calcium dynamics" (Frontiers in Physiology).

MR Vagos, "Uncertainty Quantification and Sensitivity Analysis of Multi-parameter Models", https://github.com/marciavagos/UQ_SA.git.

MRSS Vagos, IGM van Herck, J Sundnes, HJ Arevalo, AG Edwards, JT Koivumäki, "Computational modeling of electrophysiology and pharmacotherapy of atrial fibrillation: recent advances and future challenges"; *Frontiers in physiology* 9, 1221.

MR Vagos, H Arevalo, BL de Oliveira, J Sundnes, MM Maleckar, "A computational framework for testing arrhythmia marker sensitivities to model parameters in functionally calibrated populations of atrial cells"; *Chaos: An Interdisciplinary Journal of Nonlinear Science* 27 (9).

Nico Heussner, **Márcia Vagos,** Martin S.Spitzer, Wilhelm Stork, "A prediction model for ocular damage – Experimental validation", *J. Thermal Biology* 52, 38-44, August 2015.

Márcia R. Vagos, Joana M.R. Moreira, Olivia S.G.P. Soares, Manuel F.R. Pereira, Filipe J. Mergulhão, Carbon nanotubes/Poly(dimethylsiloxane) Composites Materials to Reduce Bacterial Adhesion, *Antibiotics* 9(8), 2020.

Márcia R. Vagos, Joana M.R. Moreira, Olivia S.G.P. Soares, Manuel F.R. Pereira, Filipe J. Mergulhão, Incorporation of carbon nanotubes in polydimethylsiloxane to control *Escherichia coli* adhesion, *Polymer Composites* 40, Graphene and Carbon Fibers, 2019.

Other experience

Feb - Mar 2020	Voluntary work as a photojournalist for Vårt Oslo.
Oct 2016 - present	Voluntary forró teaching in a dance school and at social events in Oslo.
Oct - Dec 2015	Cultural travel in South America.
Oct - Nov 2013	Secretary assistant at the Faculty of Engineering, University of Porto, Portugal.

IT and technical competences

Programming: Matlab, Python, bash, R, C++ , HTML, Javascript , XML, CSS, PHP, MySQL.

Software: ANSYS Fluent, HyperWorks, CARP, OpenCore, Meshalyzer, LabView, SPSS, Visual Studio.

Other: Latex, Jupyter Notebook, Git, vim, MS Powerpoint; scientific illustration (Inkscape and Biorender).

Communication: making slide presentations; speaking for audiences; scientific and technical writing.

Languages

Portuguese:	native.
English:	fluent, both written and oral.
Spanish:	advanced, both written and oral.
Norwegian:	basic understanding, both written and oral.
German:	basic understanding, both written and oral (two semesters of language study).
Japanese:	basic understanding, both written and oral (diploma of JLPT N5 obtained in 2011).

References

Joakim Sundnes — PhD supervisor, sundnes@simula.no

Hermenegild Arevalo — PhD supervisor, hermenegild@simula.no

Mary M. Maleckar — PhD advisort, mmaleck@simula.no

Nico Heussner — Supervisor at FZI, nico.heussner@robosense.ai