

Michele Scipioni

Curriculum Vitae

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During the past 4 years, I have mainly worked in the field of medical images reconstruction while doing research for my MSc and PhD in Biomedical Engineering. These years of academia have allowed me to study and experiment with probabilistic modeling and to discover a real passion for programming and software development. I am now looking for an opportunity to prove myself in a stimulating and challenging context, where teamwork will allow me to keep improving my skill set. As medical imaging is my current field of expertise, I would welcome the possibility to work on healthcare-related problems.

EDUCATION

- Nov 2015 - **Ph.D. with honors in Biomedical Engineering**, *Dipartimento di Ingegneria dell'Informazione (DII), University of Pisa, Pisa, IT.*
Oct 2018
Thesis: "4D tomographic image reconstruction and parametric maps estimation: a model-based strategy for algorithm design using Bayesian inference in Probabilistic Graphical Models"
Supervisor: Prof. Luigi Landini, Dr. Maria Filomena Santarelli
Topics: Models for 4D PET image reconstruction incorporating kinetic modeling and clustering. Strategies for improving maps' SNR and accelerating voxelwise fitting via GPU parallelization. PET reconstruction algorithms for non-Poisson data. Translation of PET techniques to DCE-MRI.
Tasks: Model design, inference algorithm derivation, software development, writing scientific publications and presentations.
- Oct 2012 - **M.Sc. in Biomedical Engineering (Laurea Magistrale)**, *School of Engineering, University of Pisa, Pisa, IT, Final Mark: 110/110 cum laude.*
Apr 2015
Topics: Biomedical Signal and Image Analysis, Analogic and Digital Electronics, Minimally invasive devices, Bioinformatics (Python), Databases (SQL, HTML, BMF), Android, Diagnostic instrumentation (RX, CT, PET, SPECT, MRI)
Thesis: "New methods for direct estimation of kinetic parameters from dynamic PET images"
Supervisor: Prof. Luigi Landini, Dr. Maria Filomena Santarelli
- Oct 2008 - **B.Sc. in Biomedical Engineering (Laurea Triennale)**, *School of Engineering, Università Politecnica delle Marche, Ancona, IT, Final Mark: 109/110.*
Dec 2011
Topics: Mathematics, Physics, Informatics (C++, SQL), Chemistry, Electronics, Mechanics, Automation, Physiology, Biomechanics, Electromagnetism, Biomaterials and Bioinstrumentation.
Thesis: "Analysis of the changes of locomotion patterns due to treadmill walking"
Supervisor: Prof. Sandro Fioretti

EMPLOYMENT

- Jan 2019 - **Research Associate**, *Institute of Clinical Physiology at National Research Council (IFC-CNR, Pisa, PI, Italy.*
ongoing
Assisting ongoing research projects in Nuclear Medicine dept.: study design; data acquisition and image reconstruction; software development; data processing; manuscripts drafting.
Supervisors: Dr. Maria Filomena Santarelli

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August 1, 2019

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Jan 2017 - **Graduate Research Assistant**, *Athinoula A. Martinos Center for Biomedical Imaging at Massachusetts General Hospital*, Boston, MA, USA.

Developing models and algorithm for kinetic-informed dPET and DCE-MRI image reconstruction, and Gaussian-Mixture models for dPET image segmentation, using Python (*Occiput*) and CUDA (*gpuKMfit*). Design of acquisition protocols for T1-mapping and simultaneous PET/DCE-MRI scan on *Siemens Biograph mMR*. Use of proprietary vendor software (*E7tools*) for pre-processing and validation of in-house developed PET/MR reconstruction suite.

Supervisors: Dr. Stefano Pedemonte; Dr. Julie C. Price; and Dr. Douglas N. Greve

May 2015 - **Biomedical Engineer Intern**, *Fondazione CNR/Toscana "G. Monasterio"*, Pisa, IT, [*Protocol n. 120882/2015 - Provincia di Pisa*].

Use of workstations (GE Discovery RX PET/CT) for acquisition, reconstruction and processing of NM data. Validating protocols for acquisition and processing of dynamic data in a clinical setting, and implementation of command-line Linux scripts for anonymization and remote transfer of raw data. Development of software (*KMtoolbox*) for kinetic analysis of dynamic PET sequences.

Supervisors: Prof. Luigi Landini

TEACHING EXPERIENCE

8-9-29-30 **Guest speaker**, *Department of Information Engineering, University of Pisa*, Pisa, IT, Nov 2018 [*Delibera n. 21 - Seduta del 16/10/2018*].

Series of 4 seminars (8 total hours) for M.Sc. Students in Biomedical Engineering, about emission tomography statistical image reconstruction and kinetic modeling.

Supervisor: Dr. Maria Filomena Santarelli

Oct 2017 - **Graduate Teaching Assistant**, *Department of Information Engineering, University of Pisa*, Pisa, IT, [*Protocol n. 0003053/2017 - Università di Pisa*].

Teaching Assistant for 248II (Biomedical Imaging) course for graduate students:

- Lectures and workshops (10 hours)
- Mentoring 2 students during their master thesis research

Supervisor: Dr. Maria Filomena Santarelli

Oct 2016 - **Graduate Teaching Assistant**, *Department of Information Engineering, University of Pisa*, Pisa, IT, [*Protocol n. 0002651/2016 - Università di Pisa*].

Teaching Assistant for 248II (Biomedical Imaging) course for graduate students:

- Lectures and workshops (10 hours)

Supervisor: Dr. Maria Filomena Santarelli

SCHOLARSHIPS AND AWARDS

2017 **Grant supporting Graduate Teaching Assistant position**, *Department of Information Engineering, University of Pisa*, Pisa, IT.

2017 **Trainee Grant Program**, *IEEE Nuclear Science Symposium and Medical Imaging Conference 2017*.

2016 **Grant supporting Graduate Teaching Assistant position**, *Department of Information Engineering, University of Pisa*, Pisa, IT.

2016 **Travel Support**, *European Molecular Imaging Meeting 2016*.

2015 **Three years fully-funded PhD Scholarship**, *Department of Information Engineering, University of Pisa*, Pisa, IT.

AUTHORED OPEN SOURCE SOFTWARE

- Occiput** Occiput Tomographic vision - AI/ML for tomographic image acquisition and reconstruction, in Python (co-authored with others).
<https://github.com/TomographyLab/Occiput>
- gpuKMfit** GPU-CUDA toolbox for fitting compartmental models to 4D medical dynamic volumes, using MAP-LM optimization implemented with pyCUDA and cuBLAS.
<https://github.com/mscipio/gpuKMfit>
- KMtoolbox** Kinetic Modeling Toolbox designed to estimate kinetic parameters from 4D PET and DCE-MRI dataset at a ROI level, in MATLAB.
<https://github.com/mscipio/KMtoolbox>

COMPUTER AND TECHNICAL SKILLS

- Programming** Python (numpy, Pytorch, Scikit-learn, pycuda, scikit-cuda), MATLAB (image and signal processing toolbox, parallel toolbox, optimization toolbox), Git(Hub), SQL, C++, CUDA
- Text Editing** L^AT_EX, Microsoft Word
- Statistics** R, Microsoft Excel
- Graphics** GIMP, Inkscape, Microsoft PowerPoint
- OS** Windows, Linux (Debian-based distros)
- Web** HTML, CSS
- Certificates** European Computer Driving Licence (ECDL)

LANGUAGE SKILLS

- Italian** Mother tongue
- English** Working proficiency | TOEFL: 105 / 120 | European level: C2 [April 2016]
- Spanish** Basic knowledge | European level: A1 [February 2015]

PROFESSIONAL AND PERSONAL INTERESTS

- Industry** Development of healthcare technology.
- Research** Computational science, machine learning, computer vision, image formation, high performance computing, MRI, PET, software design.
- Personal statement** Last years of academia have allowed me to study and experiment with probabilistic modeling and to discover a real passion for computer vision and for programming. I am now looking for an opportunity to prove myself in a stimulating and challenging context, where teamwork will allow me to keep improving my skill set. As medical imaging is my current field of expertise, I would welcome the possibility to work on healthcare-related problems.
- Interests and non-academic experiences** I strongly believe in continuous learning, enjoying spending spare time experimenting and studying new topics (mostly related to CS and ML), expanding my knowledge and skill base. I also like to dedicate myself to amateur editing of images and videos, and to the creation of websites, putting into practice a bit of self-taught knowledge. I studied piano for 8 years, but now playing is mostly a hobby. I have also worked as a swimming instructor and sea lifeguard for a few years during my undergraduate studies to support family expenses, after nearly 15 years of competitive swimming.

SOCIAL & COMMUNICATION SKILLS

- Active listener, eager to learn.
- Clear and concise (oral), precise and attentive to detail (written).
- Verbal/Non-verbal communication, teamwork and public speaking skills built both in academia and working as trainer in competitive swimming.
- Ability to handle large number of people even in contexts of emergency (several years working as lifeguard).

ORGANIZATIONAL & LEADERSHIP SKILLS

- Leadership and decision-making (lead different groups of students for academic projects).
- Ability to work both independently and in team; responsibility and trustworthiness.
- Flexibility and adaptability, always willing to listen for criticism, and to give suggestions and support.

SPECIALIZATION COURSES

- April 14, 2019 **Training School on PET/MR Image Reconstruction**, [CCP PET-MR](#), Munich, GE.
Basic principles of the physics behind the acquisition process and image reconstruction methods used for both PET and MR; extensive practical sessions with the Open Source software Synergistic Image Reconstruction Framework (SIRF).
- Sept 10-13, 2018 **XXXVII Scuola Annuale di Bioingegneria (Summer School)**, [Gruppo Nazionale di Bioingegneria](#), Bressanone, BZ, IT.
- Feb 8-9-13-15, 2018 **Introduction to Deep Learning with Keras**, *Università di Firenze*, Firenze, IT.
Prof. Marco Bertini, Ph.D.
- Jan 10-18-19-25-26, 2018 **GPU Programming Basics**, *Università di Firenze*, Firenze, IT.
Prof. Marco Bertini, Ph.D.
- Jan 8-9-15-16, 2018 **Linear and nonlinear Kalman filtering**, *Università di Firenze*, Firenze, IT.
Prof. Luigi Chisci
- Oct 24, 2017 **Medical Image Reconstruction: theory & practice**, *2017 IEEE Nuclear Science Symposium & Medical Imaging Conference*, Atlanta, Georgia, USA.
Emission tomography image reconstruction: theory of analytic and iterative reconstruction algorithms. Practical exercises using STIR reconstruction software.
- Apr 3-6, 2017 **Freesurfer Tutorial and Workshop**, *Athinoula A. Martinos Center*, Boston, USA.
Image registration; surface-based analysis; single-subject analysis; multi-subject group analysis; integration of functional information (fMRI and MRI Diffusion) with high-resolution anatomical MRI images. Lectures followed by practical exercises, using the FreeSurfer, Matlab and R.
- June 24, 2015 **New trend in high-resolution pre-clinical molecular imaging**, *IFC-CNR*, Pisa, IT.
MRI and ultrasound pre-clinical imaging; high resolution ultrasound and photoacoustic imaging in oncology; practical demonstration by Visualsonics: Vevo 3100 and LAZR
- June 15-16-17, 2015 **Medical Imaging Lab**, *Ospedale del Cuore*, Massa, MS, IT.
Starting from the acquisition of MR and CT images directly on the scanners, notions and tools are be offered to allow participants to transfer, process and visualize the acquired datasets.
- June 12, 2015 **Training for staff exposed to magnetic fields**, *Ospedale del Cuore*, Massa, MS, IT.
- Oct 24, 2015 **Introduction to Latex**, *G.i.O. - Students' association at University of Pisa*, Pisa, IT.

PUBLICATIONS

PEER REVIEWED JOURNAL PUBLICATION

- **M Scipioni**, S Pedemonte, MF Santarelli, L Landini "*Probabilistic Graphical Models for dynamic PET: a novel approach to direct parametric map estimation and image reconstruction*". IEEE Transactions on Medical Imaging, (early access), 2019.
- **M Scipioni**, A Giorgetti, D Della Latta, S Fucci, V Positano, L Landini, MF Santarelli "*Direct parametric maps estimation from dynamic PET data: an iterated conditional modes approach*", Journal of Healthcare Engineering, 21, 2018.
- **M Scipioni**, A Giorgetti, D Della Latta, S Fucci, V Positano, L Landini, MF Santarelli "*Accelerated PET kinetic maps estimation by analytic fitting method*", Computers in biology and medicine, 99, 221-235, 2018.
- OA Catalano, L Umutlu, N Fuin, ML Hibert, **M Scipioni**, S Pedemonte, M Vangel, AM Catana, K Herrmann, F Nensa, D Groshar, U Mahmood, BR Rosen, C Catana "*Comparison of the clinical performance of upper abdominal PET/DCE-MRI with and without concurrent respiratory motion correction (MoCo)*". Eur J Nucl Med Mol Imaging, 45(12), 2147-2154, 2018.
- N Fuin, OA Catalano, **M Scipioni**, LPW Canjels, D Izquierdo, S Pedemonte, C Catana "*Concurrent Respiratory Motion Correction of Abdominal PET and DCE-MRI using a Compressed Sensing Approach*", Journal of Nuclear Medicine, 59 (9), 1474-1479, 2018.
- MF Santarelli, N Vanello, **M Scipioni**, G Valvano, L Landini "*New Imaging Frontiers in Cardiology: Fast and Quantitative Maps from Raw Data*", Current pharmaceutical design, 23 (22), 3268-3284, 2017.
- MF Santarelli, D Della Latta, **M Scipioni**, V Positano, L Landini "*A Conway–Maxwell-Poisson (CMP) model to address data dispersion on positron emission tomography*", Computers in biology and medicine, 77, 90-101, 2016.

SUBMISSIONS CURRENTLY UNDER REVISION

- **M Scipioni**, MF Santarelli, A Giorgetti, V Positano, L Landini "*Negative binomial maximum likelihood expectation maximization (NB-MLEM) algorithm for reconstruction of pre-corrected PET data*". Undergoing peer-review at Computers in Biology and Medicine

PRESENTATIONS AT CONFERENCES & WORKSHOPS

PEER-REVIEWED INTERNATIONAL CONFERENCES

- **M Scipioni** "*Direct 4D PET reconstruction with discrete tissue types*", 2019 41th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Berlin, Germany, July 2019.
- **M Scipioni**, N Fuin, JC Price, OA Catalano, C Catana. "*A kinetic-guided compressed sensing approach for DCE-MRI reconstruction*", ISMRM 27th Annual Meeting & Exposition, Montreal, Canada, 11-16 May 2019.
- **M Scipioni**, MF Santarelli, L Landini, C Catana, DN Greve, JC Price, S Pedemonte "*Kinetic compressive sensing*", 2017 IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC) (pp. 1-5). Atlanta, GE, USA, 2017.
- **M Scipioni**, MF Santarelli, V Positano, L Landini "*The Influence of Noise in Dynamic PET Direct Reconstruction*", XIV Mediterranean Conference on Medical and Biological Engineering and Computing 2016, 308-313, 2016.

- **M Scipioni**, MF Santarelli, A Giorgetti, V Positano, S Fucci, L Landini "*Pharmacokinetic analysis of dynamic PET data: comparison between direct parametric reconstruction and conventional indirect voxel-based estimation*", XI European Molecular Imaging Meeting 8-10 March, Utrecht, 2016.

NON-PEER-REVIEWED EVENTS

- **M Scipioni**, N Fuin, MF Santarelli, L Landini, OA Catlano, C Catana, DN Greve, JC Price, S Pedemonte "*Kinetic compressive sensing: improving image reconstruction and parametric maps*", Athinoula A. Martinos Center for Biomedical Imaging Scientific Open House, 25 May, Boston, 2017.

DECLARATIONS

I declare that the information in this Curriculum Vitae is correct and true.

Date *August 1, 2019*

Signature



I authorize the use of these personal data for the purposes of review of my qualifications for any post or position for which I have applied, according to Italian Law 196/2003, and for no other purpose.

Date *August 1, 2019*

Signature

