Curriculum Vitae

Carole Frindel
French citizenship, 34 years old
One child (born in 2015, 6 months parental leave)
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Education

2006-2009 **Ph.D. in Bioengineering** (Institut National des Sciences Appliquées: INSA, Lyon, France)
"Diffusion tensor magnetic resonance imaging in human cardiac imaging: treatments and first interpretations"

2005-2006 **M.Sc. in Biophysics and Signal Processing** (University of Montréal: UdM, Montréal, Canada)

2001-2006 **M.Sc. in Bioinformatics and Modelling** (Institut National des Sciences Appliquées: INSA, Lyon, France)

Experience

2011-today **Associated professor** (maître de conférences) in the First Cycle and Biosciences departments of the INSA Lyon engineering school and the CREATIS laboratory (CNRS UMR 5220 – INSERM U1206)

2010- 2011 **R&D engineer** in a software publishing company dedicated to numerical modeling solutions for custom orthopedic equipment (ORTEN, Lyon, France)

2009-2010 **R&D engineer** in a software publishing company for the analysis and visualization of biomedical images (INTRASENSE, Montpellier, France)

Funding IDs

2018-2021 **Partner**: European project Future and Emerging Technologies PROCHIP (PI: Francesca Bragheri). Chromatin organization profiling with high-throughput super-resolution microscopy on a CHIP. WP1 group leader on "Protocols for imaging, sample preparation and image processing" (budget to manage: 400 k€)

2017-2018 **Project leader**: Projets Exploratoires Premier Soutien (PEPS) "Collaborative project with public and private partnership": Quantification adapted to the follow-up of the rehabilitation of NEUROlogical patients: application of a network of wireless SENSors (NEUROSENS) (budget to manage: 20 k€)

2013-2017 **Partner**: European project Marie Curie Initial Training Network TRANSACT (PI: Sabine Van Huffel). Transforming Magnetic Resonance Spectroscopy in a clinical tool. WP6 working group Leader on Multi-Modal Fusion (budget to manage: 200 k€)

Research Record

Research topics: Signal processing, Machine learning, Statistical data processing and applications using signal processing, Scientific computing, Simulation and modelling tools, Neuroimaging and computational neuroscience

- **Application of low-cost sensors in medicine.** My main motivation is to demonstrate whether commercially available low-cost sensors are applicable in the medical field or not. Do they have sufficient resolution, sensitivity, noise robustness to accurately describe the physiological phenomena involved? This study covers gait signals and physiological signals such as electrocardiogram and oximetry. It involves the development of experimental protocols with rehabilitation services and methodological tools (signal processing, descriptor extraction and machine learning techniques).

- **Simulation for imaging in biology**. Simulation is achieved through visual plausibility that aims creating a synthetic image that has the same visual information as reality. Information means the knowledge of the statistical properties of objects. My main concern with simulation is to evaluate the quality of automated post-processing algorithms of images produced by different types of imaging systems in biology. We have thus addressed problems of detection, deconvolution, registration and tractography in magnetic resonance imaging, by contrast X-ray phase and microscopy. Statistical modeling was performed at different spatial and temporal scales from cell scale to tissue level.

- **Prediction of the lesional and clinical outcome of stroke.** For this study, we examined different magnetic resonance imaging modalities (diffusion MRI, perfusion MRI, anatomical T1, T2 and FLAIR MRI) to allow predictive modelling for stroke risk and outcome. Different methodological tools were investigated: statistical regressions models on lesion shapes and machine learning techniques on imaging data.

- **Quantification of tissue perfusion and permeability with MRI**. My main contribution to the field is the development of methodological tools, based on spatio-temporal deconvolution, to extract quantitative hemodynamic parameters from the kinetics of an MR contrast agent. These works had broad applications both in the pre-clinical and in the clinical arenas: stroke and myocardial infarction.

Supervision:

- **6 PhD thesis** (Hugo Rositi, 2012-2015; Chloé Murtin, 2013-2016; Claudio Stamile, 2013-2017; Mathilde Giacalone, 2014-2017; Timothée Jacquesson, 2015-today; Noëlie Debs, 2017-today)
- **12 Msc thesis** (Anaïs Rouanet, 2012-2013; Grégoire Colson, 2013-2014; Mathilde Giacalone, 2013-2014; Gilda Costantino, 2015-2016; Clément Douarre, 2015-2016; Pierre Gard, 2016-2017; Lucie Lalanne, 2016-2017; Rosa Huaman, 2016-2017; Justine Bosc 2016-2017; Méghane Decroocq 2017-2018; Théo Jourdan 2017-2018; Léon Victor 2017-2018)

Other academic services

Since 2014 Head of the image and signal processing and analysis module (ANIMAG) at the Biosciences department of the INSA Lyon engineering school

Since 2014 Head of IT training in the "High Level Sports" section of the INSA Lyon engineering school, in charge of 5 teachers and instructors

Since 2013 Member of the Management and Animation Committee (CGA) of the Computer Science discipline of the First Cycle Department of the INSA Lyon engineering school

Since 2013 Elected member of the CREATIS unit council

Since 2012 Co-head of a continuous training module in image and signal analysis of the IBISA Lyon Bio Image platform (http://spiralconnect.univ-lyon1.fr/webapp/website/website.html?id=3405573&pageId=225905)

Major publications in the last 5 years

1. Murtin, C., Frindel, C., Rousseau, D., & Ito, K. (2018). Image processing for precise three-dimensional registration and stitching of thick high-resolution laser-scanning microscopy image stacks. *Computers in biology and medicine*, *92*, 22-41.
2. Jacquesson, T., Mertens, P., Frindel, C., Jouanneau, E., & Cotton, F. (2017). Is that tractography applicable to cranial nerves: Interest in neuroanatomy and skull base surgery. *Morphologie*, *101*(335), 195-196.
3. Giacalone, M., Frindel, C., Robini, M., Cervenansky, F., Grenier, E., & Rousseau, D. (2017). Robustness of spatio-temporal regularization in perfusion Mri deconvolution: An application to acute ischemic stroke. *Magnetic resonance in medicine*, *78*(5), 1981-1990.
4. Frindel, C., & Rousseau, D. (2017, October). How Accurate Are Smartphone Accelerometers to Identify Intermittent Claudication? In *International Conference on IoT Technologies for HealthCare* (pp. 19-25). Springer, Cham.
5. Gard, P., Lalanne, L., Ambourg, A., Rousseau, D., Lesueur, F., & Frindel, C. (2017, October). A Secured Smartphone-Based Architecture for Prolonged Monitoring of Neurological Gait. In *International Conference on IoT Technologies for HealthCare* (pp. 3-9). Springer, Cham.
6. Giacalone, M., Frindel, C., Grenier, E., & Rousseau, D. (2017). Multicomponent and Longitudinal Imaging Seen as a Communication Channel—An Application to Stroke. *Entropy*, *19*(5), 187.
7. Giacalone, M., Frindel, C., Zagala, R., Cho, T. H., Berthezène, Y., Nighoghossian, N., & Rousseau, D. (2017). On the influence of normalization strategies for perfusion MRI in acute stroke.
8. Stamile, C., Kocevar, G., Cotton, F., Durand-Dubief, F., Hannoun, S., Frindel, C., ... & Sappey-Marinier, D. (2016). A sensitive and automatic white matter fiber tracts model for longitudinal analysis of diffusion tensor images in multiple sclerosis. *PloS one*, *11*(5), e0156405.
9. Frindel, C., Rouanet, A., Giacalone, M., Cho, T. H., Østergaard, L., Fiehler, J., ... & Nighoghossian, N. (2015). Validity of shape as a predictive biomarker of final infarct volume in acute ischemic stroke. *Stroke*, *46*(4), 976-981.
10. Frindel, C., Robini, M. C., & Rousseau, D. (2014). A 3-D spatio-temporal deconvolution approach for MR perfusion in the brain. *Medical image analysis*, *18*(1), 144-160.
11. Rositi, H., Frindel, C., Langer, M., Wiart, M., Olivier, C., Peyrin, F., & Rousseau, D. (2013). Information-based analysis of X-ray in-line phase tomography with application to the detection of iron oxide nanoparticles in the brain. *Optics express*, *21*(22), 27185-27196.