

EMPLOYMENT

- ▶ **Computer Scientist, USC**, Los Angeles California, USA, 2019-
Research Areas: Graph Signal Processing and Human Behavioral Machine Intelligence, applications in health
Software production: (details in the Software Productions section)
Continued work on GraSP (see PhD item below)
IoT cloud-based data collection pipeline for the Tiles project
- ▶ **Postdoctorate in Electrical in Computer Engineering, USC**, Los Angeles California, USA, 2016-2019
Mentors: Pr. Antonio Ortega and Pr. Shrikanth S. Narayanan
Research Areas: Graph Signal Processing and Human Behavioral Machine Intelligence, applications in health
Software production: (details in the Software Productions section)
Continued work on GraSP (see PhD item below)
Replicable cloud-based inference pipeline for the Tiles project
- ▶ **PhD in Computer Science, ENS de Lyon**, Lyon, FRANCE, 2012-2015
Supervisors: Éric Fleury and Paulo Gonçalves
Subject: Signal Processing on Graphs – Contributions to an Emerging Field
Graduation: 1st December 2015
Software production: GraSP (**Graph Signal Processing**) toolbox for Matlab (gforge.inria.fr/projects/grasp/)
- ▶ **Teaching Assistant in Computer Science, ENS de Lyon**, Lyon, FRANCE, 2012-2015
2014-2015 – ACM Preparation (practical course of solving algorithmic problems using ACM-ICPC problems), L3 (Professor: Éric Thierry) [21 hours]
2013-2015 – Software project management, M1 (Professor: Eddy Caron) [72 hours]
2012-2014 – Optimization, M1 (Professor: Stéphan Thomassé) [48 hours]
2012-2013 – Project 2 (Implementation of a SAT Solver), L3 (Professor: Daniel Hirschhoff) [32 hours]

RESEARCH PROJECTS

- ▶ **TILES** – Tracking Individual pErformance with Sensors (<http://sail.usc.edu/tiles/>).
Funding: IARPA program MOSAIC (<https://www.iarpa.gov/index.php/research-programs/mosaic>)
Motivations: Wellness of the workforce is an important factor of performance. The Tiles project proposes to study individual differences, mental states, and well-being impact over performance in the workplace using unobtrusive physiological and environmental sensors.
Collected Data: Unique multimodal dataset with physiological (PPG HR, HRV, steps, sleep, accelerometry, voice features without raw audio, phone usage), and environmental (location in the workplace, temperature and humidity) data coupled with survey data (two per days) for more than 350 participants (direct health care personnel) enrolled over 10 weeks. Resulting dataset is more than 3.5Tb. Another dataset (currently collected), involves more than 150 participants (more than 50 residents in an intensive care unit and more than 100 other personnel) enrolled for a 4 weeks study for a similar dataset.
Roles:
 - USC team leadership
 - Data management and curation leadership
 - IoT data collection pipeline design and implementation (see Section Software Productions)
 - Software deliverables
 - Replicable cloud-based inference pipeline design and implementation (see Section Software Productions)
- ▶ **MOSAR** – Mastering hOSpital Antimicrobial Resistance
Funding: EU Project (Life Science Health Priority of the Sixth Framework Program)
Motivations: Nosocomial infections (contracted in a health care institution) are becoming increasingly problematic as bacterial strains gain resistances to more and more antibiotic, with some resisting to all known antibiotics.

Understanding the spread of these bacteria given social interactions is critical to design health care best practices that prevent their spread.

Collected Data: Over four months, participating personnel (261) and patients (329) in an hospital wore an RFID badge recording every 30s other badges within 1.5 meters. Every week, mouth swabs were collected and cultured in a lab to record *staphylococcus aureus* strains carried by the participants.

Role: Creation of a PostgreSQL database, cleaning up of raw data, and modeling using graph signal processing.

RESEARCH TOPICS OF INTEREST

Main Topics

- ▶ **Graph Signal Processing**
- ▶ **Statistical Signal Processing**
- ▶ **Signal Processing**
- ▶ **Graph Analysis**
- ▶ **Network Science**

Additional Topics

- ▶ IoT
- ▶ Distributed computing
- ▶ Graph theory
- ▶ Big data
- ▶ Clustering algorithms

PUBLICATIONS

Submitted

- ▶ Eduardo Pavez, [Benjamin Girault](#), Antonio Ortega, and Philip A. Chou. Region Adaptive Graph Fourier Transform for 3d Point Clouds. submitted to ICIIP 2020
- ▶ Karel Mundnich, Brandon M. Booth, Michelle L'Hommedieu, Tiantian Feng, [Benjamin Girault](#), Justin L'Hommedieu, Mackenzie Wildman, Sophia Skaaden, Amrutha Nadarajan, Jennifer L. Villatte, Tiago H. Falk, Kristina Lerman, Emilio Ferrara, and Shrikanth Narayanan. TILES: A longitudinal physiologic and behavioral data set of hospital workers. submitted to Nature Scientific Data

International Journal

- ▶ Karel Mundnich, Brandon M. Booth, [Benjamin Girault](#), and Shrikanth Narayanan. Generating labels for regression of subjective constructs using triplet embeddings. *Pattern Recognition Letters*, 128:385–392, December 2019
- ▶ [Benjamin Girault](#), Antonio Ortega, and Shrikanth S. Narayanan. Irregularity-Aware Graph Fourier Transforms. *IEEE Transactions on Signal Processing*, 66(21):5746–5761, Nov 2018
- ▶ [Benjamin Girault](#), Paulo Gonçalves, and Éric Fleury. Translation on Graphs: An Isometric Shift Operator. *Signal Processing Letters, IEEE*, 22(12):2416–2420, Dec 2015

Peer-Reviewed International Conference Papers with Proceedings

- ▶ [Benjamin Girault](#), Antonio Ortega, and Shrikanth Narayanan. Graph Vertex Sampling with Arbitrary Graph Signal Hilbert Spaces. In *2020 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*. IEEE, May 2020
- ▶ Karel Mundnich, [Benjamin Girault](#), and Shrikanth S. Narayanan. Bluetooth Based Indoor Localization Using Triplet Embeddings. In *ICASSP 2019 - 2019 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, pages 7570–7574, Brighton, United Kingdom, May 2019
- ▶ Alexander Serrano, [Benjamin Girault](#), and Antonio Ortega. Graph Variogram: a Novel Tool to Measure Spatial Stationarity. In *2018 IEEE Global Conference on Signal and Information Processing (GlobalSIP 2018)*, pages 753–757, Anaheim, CA, USA, December 2018. IEEE
- ▶ [Benjamin Girault](#), Shrikanth S. Narayanan, and Antonio Ortega. Towards a definition of local stationarity for graph signals. In *2017 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, pages 4139–4143, New Orleans, LA, USA, March 2017. IEEE
- ▶ [Benjamin Girault](#), Shrikanth S. Narayanan, Antonio Ortega, Paulo Gonçalves, and Eric Fleury. Grasp: A matlab toolbox for graph signal processing. In *2017 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, pages 6574–6575, New Orleans, LA, USA, March 2017. IEEE
- ▶ [Benjamin Girault](#), Paulo Gonçalves, Shrikanth S. Narayanan, and Antonio Ortega. Localization Bounds for the Graph Translation. In *2016 IEEE Global Conference on Signal and Information Processing*, pages 331–335, Washington, DC, USA, Dec 2016

- ▶ [Benjamin Girault](#). Stationary Graph Signals using an Isometric Graph Translation. In *Signal Processing Conference (EUSIPCO), 2015 Proceedings of the 23rd European*, pages 1516–1520, Nice, France, August 2015. IEEE
- ▶ [Benjamin Girault](#), Paulo Gonçalves, Eric Fleury, and Arashpreet Singh Mor. Semi-Supervised Learning for Graph to Signal Mapping: a Graph Signal Wiener Filter Interpretation. In *Proceedings of IEEE International Conference on Acoustics, Speech, and Signal Processing*, pages 1115–1119, Florence, Italy, May 2014
- ▶ Florian Schlachter, Christopher Schwarzer, [Benjamin Girault](#), and Paul Levi. A Modular Software Framework for Heterogeneous Reconfigurable Robots. In Paul Levi, Oliver Zweigle, Kai Häußermann, and Bernd Eckstein, editors, *Autonomous Mobile Systems 2012*, Informatik aktuell, pages 193–201. Springer Berlin Heidelberg, 2012

Peer-Reviewed National Conference Papers with Proceedings

- ▶ [Benjamin Girault](#), Paulo Gonçalves, and Éric Fleury. Signaux Stationnaires sur graphe : étude d'un cas réel. In *Proc. of GretsI 2015*, September 2015
- ▶ [Benjamin Girault](#), Éric Fleury, and Paulo Gonçalves. Traitement du Signal sur Graphe : Interprétation en termes de Filtre de l'Apprentissage Semi-Supervisé sur Graphe. In *Proceedings of AlgoTel 2014*, June 2014
- ▶ [Benjamin Girault](#), Paulo Gonçalves, and Éric Fleury. Graphe de contacts et ondelettes : étude d'une diffusion bactérienne. In *Proceedings of GretsI 2013*, September 2013

Invited Conference Papers

- ▶ [Benjamin Girault](#) and Antonio Ortega. What's in a frequency: new tools for graph Fourier Transform visualization. In *2019 Information Theory and Applications Workshop*, San Diego, CA, USA, February 2019
- ▶ Vincent Gripon, Antonio Ortega, and [Benjamin Girault](#). An Inside Look at Deep Neural Networks using Graph Signal Processing. In *2018 Information Theory and Applications Workshop*, San Diego, CA, USA, February 2018
- ▶ [Benjamin Girault](#), Narayanan Shrikanth, S., and Antonio Ortega. Local stationarity of graph signals: insights and experiments. In *Proceedings Volume 10394, Wavelets and Sparsity XVII*, pages 103941P 1–17. SPIE, 2017
- ▶ [Benjamin Girault](#), Eric Fleury, and Paulo Gonçalves. Function analysis through wavelets on dynamic contact graphs. In *ECCS Satellite Contagion workshop*, Barcelona, Spain, September 2013

Book Chapters

- ▶ Serge Kernbach, [Benjamin Girault](#), and Olga Kernbach. On Self-Optimized Self-Assembling of Heterogeneous Multi-robot Organisms. In *Bio-Inspired Self-Organizing Robotic Systems*, pages 123–141. 2011

Posters

- ▶ [Benjamin Girault](#), Paulo Gonçalves, Éric Fleury, and Arashpreet S. Mor. Semi-Supervised Learning for Graph to Signal Mapping: a Graph Signal Wiener Filter Interpretation, 2013. Poster presented at Réunion GDR ISIS, November 25, 2013
- ▶ [Benjamin Girault](#). Graphe de contacts et ondelettes, 2013. Poster presented at GDR ASR Rescom 2013, May 13–17, Île de Porquerolles, France

Research Reports

- ▶ [Benjamin Girault](#), Paulo Gonçalves, and Eric Fleury. Translation and Stationarity for Graph Signals. Research Report RR-8719, École Normale Supérieure de Lyon ; Inria Rhône-Alpes, April 2015

Other Publications

- ▶ Serge Kernbach, Florian Schlachter, Raja Humza, Jens Liedke, Sergej Popesku, S. Russo, T. Ranzani, L. Manfredi, C. Stefanini, R. Matthias, Ch. Schwarzer, [Benjamin Girault](#), P. Alschbach, Eugen Meister, and Oliver Scholz. Heterogeneity for Increasing Performance and Reliability of Self-Reconfigurable Multi-Robot Organisms. *CoRR*, abs/1109.2288, 2011

SOFTWARE PRODUCTIONS

▶ IoT Data Collection Pipeline

2019-: (currently running) IoT bluetooth hubs sending packets data over UDP (Owl-in-One from ReelyActive) to an AWS EC2 instance for filtering (against a white list of bluetooth device IDs, using node.js) and forwarding to an Elasticsearch cluster hosted by Elastic.co. The Elasticsearch indexes the packets to easily search the data, and monitors battery life of the bluetooth devices, and liveness of the bluetooth hubs and send alerts to Slack. Finally, another dedicated instance performs daily dumps of the data to AWS S3 for future processing. Data collection

running since early November 2019 (about 1200 recorded packets/s, continuously) and expected to end in April 2020. Further processing using bash and node.js to extract battery life, location and contact data between devices. Bluetooth devices tracked are based on a Puck.js hardware (Espruino) and with a custom firmware (Node.js) I wrote to fit the need of the project: up to 7 devices from the vicinity recorded, and low power (standby) mode when not in range of a hub.

▶ **Inference Pipeline for TILES**

2018-2019: (not yet published) Reproducible inference pipeline in AWS using Docker for encapsulation and reproducibility, and AWS EMR (Spark and Hadoop) for load distribution, and AWS S3 for storage. Scripted (bash) turn key solution provided to IARPA research program MOSAIC to build the infrastructure, run it, and monitor it.

▶ **Matlab toolbox: GraSP (Graph Signal Processing)**

2012-2020: <https://gforge.inria.fr/projects/grasp/>

SEMINARS

- ▶ **May 2019:** Laboratoire Jean Kuntzman, Grenoble, France
- ▶ **March 2017:** Centrale-Supélec, Saclay, France
- ▶ **March 2017:** Télécom Bretagne, Brest, France
- ▶ **February 2017:** Barbados GSP Gathering, Barbados
- ▶ **October 2016:** Ryerson University, Toronto, Ontario, Canada
- ▶ **October 2016:** McGill University, Montréal, Québec, Canada
- ▶ **April 2016:** University of Southern California, Los Angeles, CA, États-Unis

COLLECTIVE SERVICES

Reviews

- ▶ IEEE Transaction on Signal Processing (16, including revised submissions)
- ▶ IEEE Selected Topics in Signal Processing (5)
- ▶ IEEE Signal Processing Letters (6)
- ▶ Elsevier Journal on Signal Processing (1)
- ▶ Elsevier Applied and Computational Harmonic Analysis (1)

Program Committee

- ▶ The Web Conference 2020 (<https://www2020.thewebconf.org/>)
- ▶ The Web Conference 2019 (<https://www2019.thewebconf.org/>)
- ▶ IEEE GlobalSIP 2018 (<https://2018.ieeeglobalsip.org/>)
- ▶ IEEE GlobalSIP 2017 (<http://www.2017.ieeeglobalsip.org/>)

Session Chair

- ▶ SPIE Wavelets & Sparsity XVIII (2019), special session on *Graph Signal Processing*
- ▶ IEEE GlobalSIP 2016 (<http://www.2016.ieeeglobalsip.org/>)

Special Session Organization

- ▶ SPIE Wavelets & Sparsity XVIII (2019), special session on *Graph Signal Processing* (with Sophie Achard and Pierre Borgnat)

RESEARCH CO-SUPERVISION

PhD Students

- ▶ **Karel Mundnich** (PhD advisor: Shrikanth S. Narayanan) – 2019- – *ongoing*
- ▶ **Alexander Serrano** (PhD advisor: Antonio Ortega) – 2018-2019

Interns

- ▶ **Aymeric Fromherz** (supervisor: P. Gonçalves) – 2014 – Traitement du signal sur des graphes et détection de communautés (Graph signal processing and community detection)
- ▶ **Arashpreet Singh Mor** (supervisor: P. Gonçalves) – 2013 – Graph to Signal Mapping: Study of a Duality Principle

WORKING GROUPS

- ▶ **Stationarity on Graphs** – In collaboration with the signal processing team Sysiphe (ENS Lyon)

RESEARCH SCHOOLS

- ▶ **2014** – 9^e école d'été de Peyresq en traitement du signal et des images : Traitement du signal et des images en grandes dimensions
- ▶ **2013** – École d'été Rescom: Les réseaux centrés sur les contenus, Évolution ou révolution de l'Internet ?
- ▶ **2010** – Winter School: Hot Topics in Distributed Computing

MISCELLANEOUS

- ▶ *Programming / Computer Science Skills*: AWS (including EC2, S3, IAM, EMR, ECR), ElasticSearch, Docker, Puppet, Matlab, Python, Node.js, C, C++, Bash, Java, Prolog, PostgreSQL, OCaml, HTML, PHP, JavaScript, Qt.
- ▶ *Languages*: French (mother tongue), English (fluent), German (basic understanding), Spanish (basic understanding)
- ▶ *Other Interests*: Programming, Free Softwares, Electronic, Mechanics, DIY, Guitar, Windsurfing, Hiking, Photography

RESEARCH INTERNSHIPS

- ▶ *Master Internship at IRISA (Rennes, France) with Anne-Marie Kermarrec (March-July 2012)*: Clustering in an heterogeneous gossip protocol for news recommendation
- ▶ *Internship at Universität Stuttgart (Germany) with Serge Kernbach (September 2010 - July 2011)*: Towards Self-Assembling of Robotic Modules
- ▶ *Internship at EPFL, Lausanne (Switzerland) with Rachid Guerraoui (March-July 2010)*: Theoretical analysis of a gossip-based protocol, *What's Up*, a news broadcasting peer to peer system
- ▶ *Internship at IRISA (Rennes, France) with Luc Bougé (May-July 2009)*: A distributed random number generator based on [BlobSeer](#) and running on [Grid5000](#)

EDUCATION

- ▶ Master in Computer Science, MPRI, ENS Cachan, Cachan, FRANCE, September 2012.
2011-2012 – 2nd year (Semester 1: 13.92 / Semester 2: 13.00 / Year: 13.46):
 Software verification (Major) and Graph and Network Theory (Minor)
2009-2010 – 1st year (Semester 1: 13.28 / Semester 2: 14.50 / Year: 13.89):
- ▶ Bachelor in Computer Sciences, ENS Cachan, Cachan, FRANCE, 2009
2008-2009 – 3rd year (Year: 13.93)
- ▶ Classes Préparatoires aux Grandes Écoles, Lycée Chateaubriand, Rennes, FRANCE
2007-2008 – MP*:
 15th at the ENS Cachan – Computer Sciences competitive exam, accepted at ENS Cachan
2006-2007 – MP*:
 Accepted at Centrale Nantes
2005-2006 – MPSI