

EMPLOYMENT

- ▶ **Research Associate** (permanent full time researcher), **Inria**, Saint-Étienne, FRANCE, 2023-
Lab: *Laboratoire Hubert Curien*, Inria team *MALICE*
Research Areas: Physics-Informed Machine Learning and Graph Signal Processing
- ▶ **Assistant Professor**, **ENSAI**, Bruz, FRANCE, 2020-2023
Research Areas: Graph Signal Processing and Artificial Intelligence
Teaching: Computer Science department
 - 2022-2023** – Deep Learning & Advanced Deep Learning, M2
 - 2020-2023** – Relational Databases, L3
 - 2021-2022** – Object Oriented Programming with Java, M1
 - 2021-2022** – Libreoffice Calc Practical, L3
 - 2020-2022** – Introduction to Object Oriented Programming and Code Documentation, L3
 - 2020-2022** – Data Processing Project, L3
- ▶ **Computer Scientist**, **USC**, Los Angeles California, USA, 2019-2020
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 and 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
 - 2013-2015** – Software project management, M1
 - 2012-2014** – Optimization, M1
 - 2012-2013** – Project 2 (Implementation of a SAT Solver), L3

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 antibiotics, 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 a 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**
- ▶ **Machine Learning**
- ▶ **Physics-Informed ML**
- ▶ **Graph Fourier Transform**

Additional Topics

- ▶ Network Science
- ▶ IoT
- ▶ Distributed computing
- ▶ Graph theory
- ▶ Clustering algorithms

PUBLICATIONS

International Journal

- ▶ Eduardo Pavez, [Benjamin Girault](#), Antonio Ortega, and Philip A. Chou. Two Channel Filter Banks on Arbitrary Graphs with Positive Semi Definite Variation Operators, September 2022. Accepted in IEEE Transactions on Signal Processing
- ▶ Joanna C Yau, [Benjamin Girault](#), Tiantian Feng, Karel Mundnich, Amrutha Nadarajan, Brandon M Booth, Emilio Ferrara, Kristina Lerman, Eric Hsieh, and Shrikanth Narayanan. **TILES-2019: A longitudinal physiologic and behavioral data set of medical residents in an intensive care unit**. *Scientific Data*, 9(1):1–17, 2022
- ▶ Carlos Baquero, Paolo Casari, Antonio Fernandez Anta, Amanda García-García, Davide Frey, Augusto Garcia-Agundez, Chryssis Georgiou, [Benjamin Girault](#), Antonio Ortega, Mathieu Goessens, et al. The CoronaSurveys system for COVID-19 incidence data collection and processing. *Frontiers in Computer Science*, 3:641237, 2021
- ▶ Arindam Jati, Amrutha Nadarajan, Raghuveer Peri, Karel Mundnich, Tiantian Feng, [Benjamin Girault](#), and Shrikanth Narayanan. Temporal Dynamics of Workplace Acoustic Scenes: Egocentric Analysis and Prediction. *IEEE/ACM Transactions on Audio, Speech, and Language Processing*, 29:756–769, 2021
- ▶ Karel Mundnich, Brandon M Booth, Michelle l’Hommedieu, Tiantian Feng, [Benjamin Girault](#), Justin L’hommedieu, Mackenzie Wildman, Sophia Skaaden, Amrutha Nadarajan, Jennifer L Villatte, et al. **TILES-2018, a longitudinal physiologic and behavioral data set of hospital workers**. *Scientific Data*, 7(1):1–26, 2020
- ▶ 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, Eduardo Pavez, and Antonio Ortega. Joint Graph and Vertex Importance Learning. In *2023 31st European Signal Processing Conference (EUSIPCO)*, pages 1858–1862, 2023
- ▶ Dion E. O. Tzamarías, Eduardo Pavez, Benjamin Girault, Antonio Ortega, Ian Blanes, and Joan Serra-Sagrístà. Orthogonality and Zero DC Tradeoffs in Biorthogonal Graph Filterbanks. In *ICASSP 2021 - 2021 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, pages 5509–5513. IEEE, June 2021
- ▶ Eduardo Pavez, Benjamin Girault, Antonio Ortega, and Philip A. Chou. Spectral Folding And Two-Channel Filter-Banks On Arbitrary Graphs. In *ICASSP 2021 - 2021 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, pages 5070–5074. IEEE, June 2021
- ▶ **(ICIP 2020 Best Paper Award)** Eduardo Pavez, Benjamin Girault, Antonio Ortega, and Philip A. Chou. Region Adaptive Graph Fourier Transform for 3D Point Clouds. In *2020 IEEE International Conference on Image Processing (ICIP)*, pages 2726–2730. IEEE, October 2020
- ▶ Benjamin Girault, Antonio Ortega, and Shrikanth S. Narayanan. Graph Vertex Sampling with Arbitrary Graph Signal Hilbert Spaces. In *ICASSP 2020 - 2020 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, pages 5670–5674. 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. Transformée de Fourier sur Graphe pour les Espaces de Hilbert Quelconques. In *GRETSI 2022 - XXVIIIème Colloque Francophone de Traitement du Signal et des Images*, September 2022
- ▶ 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

- ▶ Oluwasegun Ojo, Augusto García-Agundez, Benjamin Girault, Harold Hernández, Elisa Cabana, Amanda García-García, Payman Arabshahi, Carlos Baquero, Paolo Casari, Ednaldo José Ferreira, Davide Frey, Chryssis Georgiou, Mathieu Goessens, Anna Ishchenko, Ernesto Jiménez, Oleksiy Kebkal, Rosa Lillo, Raquel Menezes, Nicolas Nicolaou, Antonio Ortega, Paul Patras, Julian C Roberts, Efstathios Stavrakis, Yuichi Tanaka, and Antonio Fernández Anta. CoronaSurveys: Using Surveys with Indirect Reporting to Estimate the Incidence and Evolution of Epidemics. In *2020 KDD Workshop on Humanitarian Mapping*, August 2020

- ▶ [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

- ▶ [Benjamin Girault](#). GSP with Matlab: The GraSP Toolbox. In *Introduction to Graph Signal Processing*, pages 253–285. Cambridge University Press, 2022
- ▶ 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

2019-2020: 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)

2012-2023: <https://www.grasp-toolbox.org/>

STUDENTS

PhD Students

- ▶ **Tiantian Feng** (PhD advisor: Shrikanth S. Narayanan) – 2020

- ▶ **Karel Mundnich** (PhD advisor: Shrikanth S. Narayanan) – 2019-2020
- ▶ **Alexander Serrano** (PhD advisor: Antonio Ortega) – 2018-2019

Interns

- ▶ **Meriem Jebali** – 2021 – Graph Learning
- ▶ **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

SEMINARS

- ▶ **Février 2023:** Laboratoire Hubert Curien, Saint Étienne, France
- ▶ **Février 2022:** Inria Rennes - Bretagne Atlantique, Rennes, France
- ▶ **Avril 2021:** Laboratoire de Physique de l'ENS de Lyon, Lyon, France
- ▶ **Mai 2020:** CREST-ENSAI, Bruz, France
- ▶ **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

With number of reviews, including resubmissions/revisions:

- ▶ IEEE Transaction on Signal Processing (23)
- ▶ IEEE Signal Processing Letters (6)
- ▶ IEEE Selected Topics in Signal Processing (5)
- ▶ IEEE Transactions On Signal and Information Processing over Networks (3)
- ▶ IEEE Signal Processing Magazine (1)
- ▶ 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)

MISCELLANEOUS

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

PRIOR EDUCATION

- ▶ Master in Computer Science, MPRI, ENS Cachan, Cachan, FRANCE, September 2012.
- ▶ Bachelor in Computer Sciences, ENS Cachan, Cachan, FRANCE, 2009

Last updated: November 16, 2023