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Born 11/5/78 in Valencia, Spain
Living in Paris, France

Juan José Burred

I am an independent researcher, software developer and musician. With a background in machine learning and signal processing, my research aims at developing innovative tools for music and sound creation, analysis and search. I'm driven by the desire of making new machine learning and source separation technologies more accessible to composers and performers. On the musical side, I'm a classically-trained pianist, and have played professionally in jazz and electronic bands.

Research topics

- Music technology, computer music
- Machine learning, artificial intelligence
- Music information retrieval
- Sound source separation, unmixing, upmixing

Professional experience

2023 **Visiting scholar**, *CNMAT*, University of California, Berkeley
- Research in non-negative neural networks for sound decomposition and resynthesis
- Guest lecturer in class Music30 ("Computational Creativity for Music and the Arts")
- Speaker at CNMAT colloquium and OpenLabs

2023–present **Founder**, *Anemond*, Paris
- Music software studio. Development and distribution of Factorsynth and Factoid

2014–present **Independent researcher/developer**, Paris
- Industrial clients (selection)
  - R&D consultant for Alta Voce, Paris (emotional transformation of speech)
  - R&D consultant for MezzoForte, Paris (software and hardware for immersive audio walks)
  - R&D consultant for Cizoo, Paris (real time voice effects)
  - Research consultant for Audionamix, Paris (improvement of speech source separation)
  - Research consultant for Mogees Ltd., London (gestural interfaces for musical performance)
- Institutional clients (selection)
  - Developer for FEMTO-ST, Besançon (implementation of real-time pitch shifting)
  - Developer for CNRS, Paris (stimuli generation for listening tests, CREAM project)
- Collaborations with musicians and artists
  - Holly Herndon and Mat Dryhurst (prototype for next-generation sampling)
  - Marco Stroppa and Carlo Laurenzi (unmixing of orchestra/electronic recordings)
  - Ralph Killhertz (generative soundscapes with neural networks)
  - Paul Purgas (real time extreme time stretching)
- Personal projects
  - Development of software for sound modification and synthesis based on source separation
  - Implementation and evaluation of source separation algorithms on iOS

2010–2013 **Lead researcher**, *Audionamix*, Paris
- Audio source separation for the music and film industries
- Music Information Retrieval for music similarity search

2007–2010 **Researcher**, *Analysis/synthesis team, IRCAM*, Paris
- Audio feature extraction for sound and music classification

2004–2007 **Researcher**, *Communication Systems Group, Technische Universität Berlin*
- Audio source separation and classification

2006 **Guest researcher**, *Analysis/synthesis team, IRCAM*, Paris
- Signal modeling for source separation

2003 **Student research assistant**, *Communication Systems Group, T.U. Berlin*
- Software implementation of the MPEG-7 Audio standard

2002–2003 **Student research assistant**, *zplane.development*, Berlin
- Audio classification

Technical education

2004–2008 **PhD in Electrical Engineering**, *Technische Universität Berlin*
PhD thesis: *"From sparse models to timbre learning: new methods for musical source separation"*

1997–2004 **Telecommunication Engineer**, *Universidad Politécnica de Madrid*
Masters thesis: *"An objective approach to content-based audio signal classification"*

Musical education

2014–2015 **Electroacoustic Composition**, *Aula de Música Experimental, Madrid*
Teachers: Alberto Bernal, Manuel de Pablos

2014–2015 **Sound Installations Course**, *Aula de Música Experimental, Madrid*
Teachers: María Andueza, Abelardo G. Fournier

2004–2005 Studies in organology (auditing student), *Universität der Künste Berlin*

1999–2001 Studies in counterpoint and fugue, *Madrid Professional Music Conservatory*

1989–2000 **Music theory degree**, *Madrid Professional Music Conservatory*
Teachers: José Luis Turina, Enrique Igoa, Jesús Villa-Rojo

1989–1997 **Piano degree**, *Madrid Professional Music Conservatory*
Teachers: Rafael Solís, Pedro Mariné

Invited talks

- "From unmixing to sonic deconstruction: creative uses of sound source separation", Adobe Research, San Francisco, United States, December 2023.
- "Computational deconstruction of sounds for music composition and performance", University of California, Santa Cruz, United States, December 2023.
- "¿Qué hay de nuevo en la síntesis sonora por ordenador?", Escuela de Música Creativa, Madrid, Spain, May 2019.
- "La deconstrucción del sonido con Factorsynth", Encuentros AVLAB, Medialab-Prado, Madrid, Spain, October 2017.
- "Factorsynth: a tool for analysis/resynthesis based on matrix factorization", IRCAM, Paris, France, October 2016.
- "Sound unmixing: principles, challenges and opportunities", Yamaha Research, Hamamatsu, Japan / AIST Tsukuba, Japan, March 2012. / Google Research, New York, USA, October 2011.
- "Audio source separation: status and challenges for audio content processing" (with P. Leveau), BBC Research, London, UK, December 2011.
- "Musical source separation: principles and state of the art", Tutorial, 2nd Int. Workshop on Learning the Semantics of Audio Signals (LSAS), Paris, France, June 2008.
- "Supervised Musical Source Separation from Mono and Stereo Mixtures based on Sinusoidal Modeling", TELECOM ParisTech, June 2008 / Music Technology Group, Universitat Pompeu Fabra, Barcelona, Spain, July 2008.
- "Modeling the spectral envelope of musical instruments", IRCAM, Paris, France, April 2006.

Thesis supervision and evaluation

Masters thesis supervision

- Mathieu Coïc, "Temporal models to perform sound source separation based on matrix factorization", Audionamix, September 2011.
- Michele Lai Chin, "Structured high-level representations of sound for large database browsing", Audionamix, August 2011.
- Agnès Pedone, "Amélioration de la séparation de la voix par la synchronisation du texte avec la parole", Audionamix, February 2011.
- Elena Martínez Hernández, "A versatile music classification system based on user-defined classes", Masters Thesis, Technical University of Berlin, 2007.
- Sebastian Wegener, "Comparison of audio features for robust classification of musical instruments" (co-supervised with Martin Haller), Masters Thesis, T.U. Berlin, 2007.

PhD thesis evaluation

- Francisco Jesús Cañadas Quesada, "Investigación y Desarrollo de Técnicas de Estimación Multipitch y su Aplicación a la Transcripción Automática de Señales Musicales Polifónicas", PhD thesis, Universidad de Jaén, December 2009.

Participation in research projects

2016–2019 **CREAM**, *Cracking the Emotional Code of Music*, Funded by: European Research Council

2012–2013 **AudioHelix**, *Rapid and Accurate Audio Browsing by Structural Pattern Modeling*, Funded by: European Union (Eureka Eurostars)

2008–2010 **Quaero**, *Funded by: Oséo, France*

2007–2008 **Sample Orchestrator**, *Funded by: Agence Nationale de la Recherche, France*

2006–2007 **K-Space**, *Knowledge Space of Semantic Inference for Automatic Annotation and Retrieval of Multimedia Content*, Funded by: European Union (Network of Excellence)

2006–2007 **VISNET-II**, *Networked Audiovisual Media Technologies*, Funded by: European Union

2004–2005 **VISNET**, *Networked Audiovisual Media Technologies*, Funded by: European Union

2003–2005 **MPEG-7-Based Audio Annotation for the Archival of Digital Video**, *Funded by: German Federal Ministry of Economics and Labour*

Published software

2019 **Factoid**, `https://anemond.net/factoid/`
- Commercial MaxForLive device for time randomization based on matrix factorization

2018 **Factorsynth**, `https://anemond.net/factorsynth/`
- Commercial VST/AU plug-in and standalone application for sound deconstruction based on matrix factorization
- Partner product of the IRCAM Forum

2017 **CLEESE**, `https://github.com/creamlab/cleese`
- Open-source Python toolbox for random voice stimuli generation for perceptual experiments

2014–2016 **Factorsynth prototype**, `https://www.jjburred.com/software/factorsynth/proto.html`
- Free Max/MSP tool for sound deconstruction based on matrix factorization

Awards and grants

2016–2024 CIR (Crédit Impôt Recherche) certification to conduct independent research, from the French Ministry of Research.

2004 First prize of the ETV/VDE (Electrical Engineering Association of Berlin and Brandenburg) for the best Masters Thesis.

2001–2002 Erasmus grant from the European Union at the Technical University of Berlin.
1999 First prize in Acoustics, Madrid Professional Music Conservatory.

Languages

Spanish Native speaker.
English Fluent (speaking, reading, writing).
German Fluent (speaking, reading, writing).
French Fluent (speaking, reading, writing).

Computer skills

Programming C, C++, Python, Matlab, iOS SDK, Scikit-Learn, PyTorch
Web HTML, CSS, WordPress
Sound Max/MSP, Max For Live, Pure Data, JUCE
Other Arduino, ESP32, LaTeX

Other activities

Organization

2008–2009 Organizer, International Workshop on Learning the Semantics of Audio Signals (LSAS)
2005 Chairman, Analysis WorkPackage of the VISNET EU-Network of Excellence

Reviewer

- IEEE Transactions on Audio, Speech, and Language Processing
- International Computer Music Conference (ICMC)
- International Conference on Music Information Retrieval (ISMIR)

Secondary education

1996 German university access exam (Abitur)
1996 Spanish university access exam (Selectividad)
1988–1996 German School Madrid

Publications

Journal papers

- J.J. Burred, E. Ponsot, L. Goupil, M. Liuni and J.J. Aucouturier, "CLEESE: An open-source audio-transformation toolbox for data-driven experiments in speech and music cognition", PLOS One, April 4, 2019.
- E. Ponsot, J.J. Burred, P. Belin and J.J. Aucouturier, "Cracking the social code of speech prosody using reverse correlation", PNAS (Proc. of the National Academy of Sciences), March 2018.
- H. Vinet, G. Assayag, J.J. Burred, G. Carpentier, N. Misdariis, G. Peeters, A. Röbel, N. Schnell, D. Schwarz and D. Tardieu, "Sample Orchestrator : Gestion par le Contenu d'Échantillons Sonores ", Traitement du Signal, Vol. 28/3-4, 2011.
- J.J. Burred, A. Röbel and T. Sikora, "Dynamic Spectral Envelope Modeling for the Analysis of Musical Instrument Sounds", IEEE Transactions on Audio, Speech and Language Processing, March 2010.
- J.J. Burred and A. Lerch, "Hierarchical Automatic Audio Signal Classification", Journal of the Audio Engineering Society, July/August 2004.

Book chapters

- J.J. Burred, M. Haller, S. Jin, A. Samour and T. Sikora, "Audio Content Analysis", in P. Hobson and Y. Kompatsiaris (Eds.), *Semantic Multimedia and Ontologies: Theory and Applications*, Springer, January 2008.

Conference papers

- J.J. Burred, "Factorsynth: a Max tool for sound analysis and resynthesis based on matrix factorization", Sound and Music Computing (SMC), Hamburg, Germany, August 2016.
- J.J. Burred, "A Framework for Music Analysis/Resynthesis Based on Matrix Factorization", Proc. Int. Computer Music Conf. (ICMC), Athens, Greece, September 2014.
- R. Hennequin, J.J. Burred, S. Maller and P. Leveau, "Speech-guided source separation using a pitch-adaptive guide signal model", Proc. ICASSP, Florence, Italy, May 2014.
- J.J. Burred, "Cross-Synthesis Based on Spectrogram Factorization", Proc. Int. Computer Music Conf. (ICMC), Perth, Australia, August 2013.
- C.E. Cella and J.J. Burred, "Advanced Sound Hybridizations by Means of the Theory of Sound-Types", Proc. Int. Computer Music Conf. (ICMC), Perth, Australia, August 2013.
- G. Peeters, F. Cornu, C. Charbuillet, D. Tardieu, J.J. Burred, M. Vian, V. Botherel, J.B. Rault and J.P. Cabanal, "A Multimedia Search and Navigation Prototype, Including Music and Video-Clips", Proc. Int. Conf. on Music Information Retrieval (ISMIR), Porto, Portugal, October 2012.
- J.J. Burred, "Genetic Motif Discovery Applied to Audio Analysis", Proc. IEEE Int. Conf. on Acoustics, Speech and Signal Processing (ICASSP), Kyoto, Japan, March 2012.
- M.L. Chin and J.J. Burred, "Audio Event Detection Based on Layered Symbolic Sequence Representations", Proc. ICASSP, Kyoto, Japan, March 2012.
- M. Coïc and J.J. Burred, "Bayesian Non-Negative Matrix Factorization with Learned Temporal Smoothness Priors", Proc. LVA/ICA, Tel-Aviv, Israel, March 2012.
- P. Leveau, J.J. Burred, S. Maller and X. Jaureguiberry, "Convolutive Common Audio Signal Extraction", Proc. IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA), New Paltz, USA, October 2011.
- A. Pedone, J.J. Burred, S. Maller and P. Leveau, "Phoneme-Level Text to Audio Synchronization on Speech Signals with Background Music", Proc. Interspeech, Florence, Italy, August 2011.
- J.J. Burred and P. Leveau, "Geometric Multichannel Common Signal Separation with Application to Music and Effects Extraction from Film Soundtracks", Proc. IEEE Int. Conf. on Acoustics, Speech and Signal Processing (ICASSP), Prague, Czech Republic, May 2011.
- X. Jaureguiberry, P. Leveau, S. Maller and J.J. Burred, "Adaptation of Source-Specific Dictionaries in Non-Negative Matrix Factorization for Source Separation", Proc. IEEE ICASSP), Prague, Czech Republic, May 2011.
- J.J. Burred and A. Röbel, "A Segmental Spectro-Temporal Model of Musical Timbre", Proc. Int. Conf. on Digital Audio Effects (DAFX), Graz, Austria, September 2010.
- M. Caetano, J.J. Burred and X. Rodet, "Automatic Segmentation of the Temporal Evolution of Isolated Acoustic Musical Instrument Sounds Using Spectro-Temporal Cues", Proc. Int. Conf. on Digital Audio Effects (DAFX), Graz, Austria, September 2010.
- H. Hahn, A. Röbel, J.J. Burred and S. Weinzierl, "Source-Filter Model for Quasi-Harmonic Instruments", Proc. Int. Conf. on Digital Audio Effects (DAFX), Graz, Austria, Sept. 2010.
- J.J. Burred and G. Peeters, "An Adaptive System for Music Classification and Tagging", Proc. Int. Workshop on Learning the Semantics of Audio Signals (LSAS), Graz, Austria, Dec. 2009.

- J.J. Burred, A. Röbel and T. Sikora, "Polyphonic Musical Instrument Recognition Based on a Dynamic Model of the Spectral Envelope", Proc. IEEE Int. Conf. on Acoustics, Speech and Signal Processing (ICASSP), Taipei, Taiwan, April 2009.
- J.J. Burred, C.E. Cella, G. Peeters, A. Röbel and D. Schwarz, "Using the SDIF Sound Description Interface Format for Audio Features", Proc. ISMIR, Philadelphia, USA, September 2008.
- N. Bogaards, C. Yeh and J.J. Burred, "Introducing ASAnnotation: A Tool for Sound Analysis and Annotation", Proc. Int. Computer Music Conf. (ICMC), Belfast, UK, August 2008.
- S. Wegener, M. Haller, J.J. Burred, T. Sikora, S. Essid and G. Richard, "On the Robustness of Audio Features for Musical Instrument Classification", Proc. European Signal Processing Conf. (EUSIPCO), Lausanne, Switzerland, August 2008.
- J.J. Burred and T. Sikora, "Monaural Source Separation from Musical Mixtures Based on Time-Frequency Timbre Models", Proc. ISMIR, Vienna, Austria, September 2007.
- L.G. Martins, J.J. Burred, G. Tzanetakis and M. Lagrange, "Polyphonic Instrument Recognition Using Spectral Clustering", Proc. ISMIR, Vienna, Austria, September 2007.
- J.J. Burred, A. Röbel and X. Rodet, "An Accurate Timbre Model for Musical Instruments and its Application to Classification", Proc. Int. Workshop on Learning the Semantics of Audio Signals (LSAS), Athens, Greece, December 2006.
- J.J. Burred and T. Sikora, "Comparison of Frequency-Warped Representations for Source Separation of Stereo Mixtures", Proc. AES Convention, San Francisco, USA, October 2006.
- J.J. Burred and T. Sikora, "On the Use of Auditory Representations for Sparsity-Based Sound Source Separation", Proc. Fifth Int. Conf. on Information, Communications and Signal Processing (ICICS), Bangkok, Thailand, December 2005.
- E. Benetos, M. Kotti, C. Kotropoulos, J.J. Burred, G. Eisenberg, M. Haller and T. Sikora, "Comparison of Subspace Analysis-Based and Statistical Model-Based Algorithms for Musical Instrument Classification", Proc. Workshop on Immersive Communication and Broadcast Systems (ICOB), Berlin, Germany, October 2005.
- H.G. Kim, J.J. Burred, T. Sikora, "How Efficient is MPEG-7 for General Sound Recognition?", Proc. of the 25th AES Int. Conf., London, UK, June 2004.
- J.J. Burred and A. Lerch, "A Hierarchical Approach to Automatic Musical genre Classification", Proc. Int. Conf. on Digital Audio Effects (DAFX), London, UK, September 2003.

Non-technical articles

- J.J. Burred, "Esquizofonías y la nueva electroacústica", Sul Ponticello, No. 70, October 2019.
- J.J. Burred, "Música, ordenadores y el gesto continuo", Input Magazine, No. 2, September 2014.

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