

## Zafar Rafii

Gracenote

Emeryville, CA, USA

[zafar.rafi@nielsen.com](mailto:zafar.rafi@nielsen.com) (professional)

[zafarrafi@gmail.com](mailto:zafarrafi@gmail.com) (personal)

[zafarrafi.com](http://zafarrafi.com)

<https://github.com/zafarrafi>

<https://www.linkedin.com/in/zafarrafi/>

### EDUCATION

- 2008-2014** Ph.D. in Electrical Engineering and Computer Science  
Thesis: "Source Separation by Repetition"  
*Northwestern University, Evanston, IL, USA*
- 2008-2011** Certificate in Cognitive Science  
*Northwestern University, Evanston, IL, USA*
- 2005-2006** Master of Science in Electrical Engineering  
*Illinois Institute of Technology, Chicago, IL, USA*
- 2003-2006** Master of Electrical Engineering, Computer Science and Telecommunications  
*Ecole Nationale Supérieure d'Electronique et de ses Applications, Cergy, France*
- 2001-2003** Classes Préparatoires aux Grandes Ecoles, Physics and Engineering Science  
*Jacques Decour, Paris, France*
- 1998-2001** Baccalauréat in Sciences  
*Louis-le-Grand, Paris, France*

### EMPLOYMENT

- 2014-now** Senior Research Engineer  
*Gracenote, Emeryville, CA, USA*
- 2013** Ph.D. Intern (6 months)  
*Gracenote, Emeryville, CA, USA*
- 2007-2008** Research Engineer (1+ year)  
*Mist Technologies (now Audionamix), Paris, France*
- 2002-2004** Student Internship (3 months)  
*Dalkia, Paris, France*

### TEACHING

- 2014** Machine Perception of Music and Audio (course evaluation: 5.4/6)
- 2012** Machine Perception of Music and Audio (course evaluation: 5.0/6)
- 2010** Introduction to Electrical Engineering (course evaluation: 5.2/6)

### FELLOWSHIPS

- 2014** Terminal Year Fellowship
- 2012** Advanced Cognitive Science Fellowship
- 2008** Walter P. Murphy Fellowship

### PUBLICATIONS

#### Patents

- Zafar Rafii. "Audio Matching based on Harmonogram," Gracenote, Inc., US 20160196343 A1, July 2016.
- Bryan Pardo and Zafar Rafii. "Audio Separation System and Method," Northwestern University, US 20130064379 A1, March 2013.

#### Journal Articles

- Zafar Rafii, Antoine Liutkus, Fabian-Robert Stöter, Stylianos Ioannis Mimilakis, Derry FitzGerald, and Bryan Pardo. "An Overview of Lead and Accompaniment Separation in Music," *IEEE/ACM Transactions on Audio, Speech, and Language Processing*, vol. 26, no. 8, August 2018.
- Zafar Rafii, Zhiyao Duan, and Bryan Pardo. "Combining Rhythm-based and Pitch-based Methods for Background and Melody Separation," *IEEE/ACM Transactions on Audio, Speech, and Language Processing*, vol. 22, no. 12, December 2014.
- Antoine Liutkus, Derry FitzGerald, Zafar Rafii, Bryan Pardo, and Laurent Daudet. "Kernel Additive Models for Source Separation," *IEEE Transactions on Signal Processing*, vol. 62, no. 16, August 2014.
- Zafar Rafii and Bryan Pardo. "REpeating Pattern Extraction Technique (REPET): A Simple Method for Music/Voice Separation," *IEEE Transactions on Audio, Speech, and Language Processing*, vol. 21, no. 1, January 2013.
- Andrew Todd Sabin, Zafar Rafii, and Bryan Pardo. "Weighting-Function-Based Rapid Mapping of Descriptors to Audio Processing Parameters," *Journal of the Audio Engineering Society*, vol. 59, no. 6, June 2011.

### Conference Proceedings

- Bongjun Kim and Zafar Rafii. "Lossy Audio Compression Identification," *26<sup>th</sup> European Signal Processing Conference*, Rome, Italy, September 3-7, 2018.
- Prem Seetharaman and Zafar Rafii. "Cover Song Identification with 2d Fourier Transform Sequences," *42<sup>nd</sup> IEEE International Conference on Acoustics, Speech and Signal Processing*, New Orleans, USA, March 5-9, 2017.
- Derry FitzGerald, Zafar Rafii, and Antoine Liutkus. "User Assisted Separation of Repeating Patterns in Time and Frequency using Magnitude Projections," *42<sup>nd</sup> IEEE International Conference on Acoustics, Speech and Signal Processing*, New Orleans, USA, March 5-9, 2017.
- Antoine Liutkus, Fabian-Robert Stöter, Zafar Rafii, Daichi Kitamura, Bertrand Rivet, Nobutaka Ito, Nobutaka Ono, and Lujie Fontecave. "The 2016 Signal Separation Evaluation Campaign," *13<sup>th</sup> International Conference on Latent Variable Analysis and Signal Separation*, Grenoble, France, February 21-23, 2017.
- Nobutaka Ono, Zafar Rafii, Daichi Kitamura, Nobutaka Ito, and Antoine Liutkus. "The 2015 Signal Separation Evaluation Campaign," *12<sup>th</sup> International Conference on Latent Variable Analysis and Signal Separation*, Liberec, Czech Republic, August 25-28, 2015.
- Zafar Rafii, Antoine Liutkus, and Bryan Pardo. "A Simple User Interface System for Recovering Patterns Repeating in Time and Frequency in Mixtures of Sounds," *40<sup>th</sup> IEEE International Conference on Acoustics, Speech and Signal Processing*, Brisbane, Australia, April 19-24, 2015.
- Antoine Liutkus, Derry FitzGerald, and Zafar Rafii. "Scalable Audio Separation with Light Kernel Additive Modelling," *40<sup>th</sup> IEEE International Conference on Acoustics, Speech and Signal Processing*, Brisbane, Australia, April 19-24, 2015.
- Derry FitzGerald, Antoine Liutkus, Zafar Rafii, Bryan Pardo, and Laurent Daudet. "Harmonic/Percussive Separation using Kernel Additive Modelling," *25<sup>th</sup> IET Irish Signals and Systems Conference*, Limerick, Ireland, June 26-27, 2014.
- Antoine Liutkus, Zafar Rafii, Bryan Pardo, Derry FitzGerald, and Laurent Daudet. "Kernel Spectrogram Models for Source Separation," *4<sup>th</sup> Joint Workshop on Hands-free Speech Communication and Microphone Arrays*, Nancy, France, May 12-14, 2014.
- Zafar Rafii, Bob Coover, and Jinyu Han. "An Audio Fingerprinting System for Live Version Identification using Image Processing Techniques," *39<sup>th</sup> IEEE International Conference on Acoustics, Speech and Signal Processing*, Florence, Italy, May 4-9, 2014.
- Zafar Rafii, François G. Germain, Dennis L. Sun, and Gautham J. Mysore. "Combining Modeling of Singing Voice and Background Music for Automatic Separation of Musical Mixtures," *14<sup>th</sup> International Society for Music Information Retrieval*, Curitiba, PR, Brazil, November 4-8, 2013.

- Zafar Rafii and Bryan Pardo. "Online REPET-SIM for Real-time Speech Enhancement," *38<sup>th</sup> IEEE International Conference on Acoustics, Speech and Signal Processing*, Vancouver, BC, Canada, May 26-31, 2013.
- Zafar Rafii and Bryan Pardo. "Music/Voice Separation using the Similarity Matrix," *13<sup>th</sup> International Society for Music Information Retrieval*, Porto, Portugal, October 8-12, 2012.
- Antoine Liutkus, Zafar Rafii, Roland Badeau, Bryan Pardo, and Gaël Richard. "Adaptive Filtering for Music/Voice Separation Exploiting the Repeating Musical Structure," *37<sup>th</sup> IEEE International Conference on Acoustics, Speech and Signal Processing*, Kyoto, Japan, March 25-30, 2012.
- Mark Cartwright, Zafar Rafii, Jinyu Han, and Bryan Pardo. "Making Searchable Melodies: Human vs. Machine," *3<sup>rd</sup> Human Computation Workshop*, San Francisco, CA, USA, August 8, 2011.
- Zafar Rafii and Bryan Pardo. "A Simple Music/Voice Separation Method based on the Extraction of the Repeating Musical Structure," *36<sup>th</sup> IEEE International Conference on Acoustics, Speech and Signal Processing*, Prague, Czech Republic, May 22-27, 2011.
- Zafar Rafii and Bryan Pardo. "Degenerate Unmixing Estimation Technique using the Constant Q Transform," *36<sup>th</sup> IEEE International Conference on Acoustics, Speech and Signal Processing*, Prague, Czech Republic, May 22-27, 2011.
- Zafar Rafii and Bryan Pardo. "Learning to control a Reverberator using Subjective Perceptual Descriptors," *10<sup>th</sup> International Society for Music Information Retrieval*, Kobe, Japan, October 26-30, 2009.

#### **Book Chapters**

- Bryan Pardo, Zafar Rafii, and Zhiyao Duan. "Audio Source Separation in Musical Context," *Handbook of Systematic Musicology*, Springer, Berlin, Heidelberg, 2018.
- Zafar Rafii, Antoine Liutkus, and Bryan Pardo. "REPET for Background/Foreground Separation in Audio," *Blind Source Separation*, Springer, Berlin, Heidelberg, 2014.

#### **Technical Reports**

- Zafar Rafii and Bryan Pardo. "A Digital Reverberator Controlled through Measures of the Reverberation," Northwestern University, EECS Department Technical Report NWU-EECS-09-08, 2009.

### **PRESENTATIONS**

#### **Tutorials**

- Josh McDermott, Bryan Pardo, and Zafar Rafii. "Leveraging Repetition to Parse the Auditory Scene," *13<sup>th</sup> International Society for Music Information Retrieval*, Porto, Portugal, October 8-12 2012.

#### **Seminars**

- Zafar Rafii. "Identifying Video Sources by Identifying Audio Compression," Télécom ParisTech, Paris, France, April 13, 2018.
- Zafar Rafii. "Source Separation by Repetition," Center for Computer Research in Music and Acoustics, Stanford University, Stanford, CA, USA, July 15, 2015.
- Zafar Rafii. "Source Separation by Repetition," Center for New Music and Audio Technologies, University of California at Berkeley, Berkeley, CA, USA, May 11, 2015.
- Zafar Rafii. "An Audio Fingerprinting System for Live Version Identification using Image Processing Techniques," *Midwest Music Information Retrieval Gathering*, Northwestern University, Evanston, IL, USA, June 14, 2014.
- Zafar Rafii. "REPET," *Midwest Music Information Retrieval Gathering*, Northwestern University, Evanston, IL, USA, June 24, 2011.
- Zafar Rafii. "A Simple Music/Voice Separation Method based on the Extraction of the Underlying Repeating Structure," Télécom ParisTech, Paris, France, July 29, 2011.

- Zafar Rafii, Raphael Blouet, and Antoine Liutkus. “Discriminant Approach within Non-negative Matrix Factorization for Musical Components Recognition,” *DMRN+2: Digital Music Research Network One-day Workshop 2007*, Queen Mary University of London, London, UK, December 18, 2007.

### Lectures

- Zafar Rafii. “Audio Fingerprinting,” EECS 352: Machine Perception of Music and Audio, Northwestern University, 2014.
- Zafar Rafii. “REpeating Pattern Extraction Technique (REPET),” EECS 352: Machine Perception of Music and Audio, Northwestern University, 2014.
- Zafar Rafii. “Rhythm Analysis in Music,” EECS 352: Machine Perception of Music and Audio, Northwestern University, 2014.
- Zafar Rafii. “Time-frequency Masking,” EECS 352: Machine Perception of Music and Audio, Northwestern University, 2014.

## SERVICE

### Organizer

- 2015-2017** *Community-based Signal Separation Evaluation Campaign (SiSEC)*  
**2015-now** *Bay Innovative Signal Hackers (BISH) Bash Meetup*

### Reviewer

- 2018** *International Conference on Latent Variable Analysis and Signal Separation (LVA/ICA)*  
**2017** *IEEE Access*  
**2017** *EURASIP Journal on Audio, Speech, and Music Processing (JASMP)*  
**2015-2017** *Journal of the Audio Engineering Society (JAES)*  
**2015-2017** *IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA)*  
**2014-2018** *European Signal Processing Conference (EUSIPCO)*  
**2014** *IEEE Signal Processing Letters*  
**2013-2016** *ACM International Conference on Multimedia*  
**2013-2017** *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*  
**2013** *International Conference on Digital Audio Effects (DAFx)*  
**2010-2018** *IEEE Transactions on Audio, Speech and Language Processing (TASLP)*  
**2009-2018** *International Society for Music Information Retrieval (ISMIR)*

### Other

- 2017** *IEEE Audio and Acoustic Signal Processing (AASP) Technical Committee (TC) member*

## PERSONAL

### Languages

- English, French (native), German (intermediate), Italian (beginner), Persian (beginner).

### Hobbies

- Baking, bass guitar, biking, cooking, eating, hiking, reading, running, traveling.

### Travel

- Andorra, Australia, Austria, Belgium, Canada, China, Czech Republic, France, Germany, Hungary, Italy, Iran, Japan, Malta, Netherlands, Portugal, Spain, United Kingdom, United States.