

# Minje Kim

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## 1. POSITIONS HELD

- Indiana University**, Bloomington, IN  
- Assistant Professor Aug. 2016 — present  
Department of Intelligent Systems Engineering  
School of Informatics and Computing
- Adobe Research**, San Francisco, CA  
- Research Intern Summers in 2012, 2013, 2014, and 2015  
Creative Technologies Lab
- University of Illinois at Urbana-Champaign**  
- Research Assistant Fall 2011 — Spring 2015 (except Fall 2014)  
Department of Computer Science  
- Teaching Assistant Fall 2014, Fall 2015, Spring 2016  
Department of Computer Science
- ETRI** (A National Lab in Korea), Daejeon, Korea  
- Researcher Feb. 2006 — Jun 2011  
Audio Research Team
- POSTECH**, Pohang, Korea  
- Research Assistant Spring 2004 — Fall 2005 (except Fall 2004)  
Department of Computer Science and Engineering  
- Teaching Assistant Fall 2004  
Department of Computer Science and Engineering

## 2. EDUCATION

- Ph.D. in Computer Science** May. 2016  
- University of Illinois at Urbana-Champaign  
- Committee: Paris Smaragdis (Advisor), Rob A. Rutenbar, Mark Hasegawa-Johnson, Gautham Mysore  
- Dissertation: "[Audio Computing in the Wild: Frameworks for Big Data and Small Computers](#)"
- M.S. in Computer Science and Engineering, *Summa Cum Laude*** Feb. 2006  
- POSTECH, Pohang, Korea  
- Advisor: Seungjin Choi  
- Thesis: "[Monaural Music Source Separation: Nonnegativity, Sparseness, and Shift-Invariance](#)"
- B.E. in Information and Computer Engineering, *Honor*** Feb. 2004  
- Ajou University, Suwon, Korea

## 3. RESEARCH FUNDING

- Intel Corporation (\$90K)** Jan. 2017 — Dec. 2017  
- Title: "Bitwise Deep Recurrent Neural Networks for Efficient Context-Aware Pervasive Systems"  
- Principal Investigator
- Korean Ministry of Science, ICT and Future Planning** Jan. 2017 — Dec. 2021  
(\$1.75M in total; IU's portion is \$330K)

- Title: "Research on Audio Signal Analysis/Synthesis Technology Based on Machine Learning"
- Principal Investigator
- In collaboration with ETRI

#### 4. HONORS, AWARDS & FELLOWSHIPS

<b>Outstanding Teaching Assistant</b>	Fall 2015
- Dept. of Computer Science, UIUC, for the class "Machine Learning for Signal Processing (CS598PS)"	
<b>Finalist for the Best Student Papers on Audio Signal Processing</b>	Jul. 2015
- For the paper published in LVA/ICA 2015 [C023]	
<b>Qualcomm Innovation Fellowship 2015 Finalist</b>	Dec. 2014
- 35 finalists out of 146 submitted proposals from 18 participating universities	
<b>Starkey Signal Processing Research Student Grant</b>	Apr. 2014
- For the paper published in ICASSP 2014 [C017]	
<b>Intel PhD Fellowship Finalist</b>	Feb. 2014
- One of six nominees to represent the University of Illinois in the national competition	
<b>Microsoft Research PhD Fellowship Nominee</b>	Oct. 2013
- Selected as one of three applicants to represent the Dept. of Computer Science in the University of Illinois	
<b>Google ICASSP Student Travel Grant and AASP Best Student Paper</b>	Jun. 2013
- For the paper published in ICASSP 2013 [C012]	
<b>Richard T. Cheng Endowed Fellowship</b>	Aug. 2011 — Jul. 2012
- As an exceptional incoming student, Dept. of Computer Science, UIUC (\$9,999)	
<b>Summa Cum Laude</b>	Feb. 2006
- POSTECH	
<b>Graduate with Honor</b>	Feb. 2004
- Ajou University	
<b>Full Scholarship for the four years of the undergraduate study</b>	Mar. 2000 — Feb. 2004
- As the top-scored student in the university entrance exam	

#### 5. TEACHING

##### Teaching Courses

- "Machine Learning for Signal Processing" (ENGR E599, ISE IUB), Fall 2017
- "Machine Learning for Signal Processing" (ENGR E599, ISE IUB), Spring 2017

##### Teaching Assistant

- "Probability in Computer Science (CS361)", Dept. of Computer Science, UIUC, Spring 2016
- "Machine Learning for Signal Processing (CS598PS, CS598PSO)", Dept. of Computer Science, UIUC, Fall 2015  
[Outstanding Teaching Assistant Award]
- "Machine Learning for Signal Processing (CS598PS)", Dept. of Computer Science, UIUC, Fall 2014
- "Automata and Formal Languages", POSTECH, Fall 2004

#### 6. ADVISING

##### PhD Advisory Committee

- Lijiang Guo (ISE at IUB), as the chair (advisor)
- Sanna Wager (Informatics at IUB), as the chair (advisor)
- Mrinmoy Maity (CS at IUB), as the chair (advisor)
- Kai Zhen (CS at IUB), as a member

### **PhD Dissertation Committee**

- Jerome Mitchell (CS at IUB), as a member
- Liang Chen (Informatics at IUB), as a member

### **Independent Study**

- Vibhatha Abeykoon (ISE at IUB): "Denoising autoencoders", Spring 2017
- Sanna Wager (Informatics at IUB): "Concatenative Sound Synthesis", Fall 2016
- Sanna Wager (Informatics at IUB): "Dereverberation in the multi-channel environment", Spring 2017
- Mrinmoy Maity (CS at IUB): "Bitwise Recurrent Neural Networks", Fall 2016, Spring 2017
- Lijiang Guo (ISE at IUB): "Hashing-based fully bitwise source separation", Spring 2017
- Lijiang Guo (ISE at IUB): "Deep Learning and Parallel Computing", Fall 2016
- Zhaozhi Zhang (ISE at IUB): Coursework advisor, Fall 2016

### **Mentoring Undergraduate Thesis Research at UIUC**

- Aswin Sivaraman: "Quantization Error Tolerance in Hashed Audio Spectra", Fall 2014 – Spring 2015
- Vinay Maddali: "Multichannel Audio Source Separation Using Probabilistic Latent Component Sharing", Fall 2012 – Spring 2013
- Igor Fedorov: "Timbre Exchange Among Speakers Using Source-Filter Model", Fall 2011 – Spring 2012

## **7. PROFESSIONAL ACTIVITIES**

### **Journal Reviewer**

- IEEE/ACM Transactions on Audio, Speech, and Language Processing
- IEEE Transactions on Neural Networks and Learning Systems
- IEEE Transactions on Signal Processing
- IEEE Signal Processing Letters
- The Journal of the Acoustical Society of America (JASA)
- Elsevier Neurocomputing
- Elsevier Signal Processing
- Elsevier Speech Communication

### **Conference Reviewer and PC Member**

- Neural Information Processing Systems (NIPS)
- Association for Advances in Artificial Intelligence (AAAI) Conferences on Artificial Intelligence (PC Member in 2017)
- IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)
- IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA) (PC Member in 2016)
- The International Society for Music Information Retrieval Conference (ISMIR)
- European Signal Processing Conference (EUSIPCO)
- Digital Audio Effects (DAFx)
- Joint Conference of Workshops on Statistical and Perceptual Audition and Speech Communication with Adaptive Learning (SAPA-SCALE)
- IEEE Global Conference on Signal and Information Processing (GlobalSIP)

### **Conference Session (Co-)Chair**

- (Co-chair) IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), "AASP-L3: Deep Learning for Source Separation and Enhancement I"

### **Member of IEEE and IEEE Signal Processing Society**

- Since 2012

## 8. PUBLICATION

### International Journal Articles

- [J004] Po-Sen Huang, *Minje Kim*, Mark Hasegawa-Johnson, and Paris Smaragdis, "Joint Optimization of Masks and Deep Recurrent Neural Networks for Monaural Source Separation," *IEEE/ACM Transactions on Audio, Speech, and Language Processing*, vol. 23, no. 12, pp. 2136-2147, Dec. 2015.
- [J003] *Minje Kim* and Paris Smaragdis, "Mixtures of Local Dictionaries for Unsupervised Speech Enhancement," *IEEE Signal Processing Letters*, vol. 22, no. 3, pp. 288-292, Mar. 2015  
(Also presented in ICASSP 2015).
- [J002] *Minje Kim*, Jiho Yoo, Kyeongok Kang and Seungjin Choi, "Nonnegative Matrix Partial Co-Factorization for Spectral and Temporal Drum Source Separation," *IEEE Journal of Selected Topics in Signal Processing*, vol. 5, no. 6, pp. 1192-1204, Oct. 2011.
- [J001] Seungkwon Beack, Taejin Lee, *Minje Kim*, and Kyeongok Kang, "An Efficient Time-Frequency Representation for Parametric-Based Audio Object Coding," *ETRI Journal*, vol. 33, no. 6, pp. 945-948, Dec. 2011.

### Refereed International Conference Proceedings

- [C029] Lijiang Guo and *Minje Kim*, "Bitwise Source Separation on Hashed Spectra: An Efficient Posterior Estimation Scheme Using Partial Rank Order Metrics," In Proc. *IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA)*, New Paltz, NY, Oct. 15 – 18, 2017 (under review).
- [C028] *Minje Kim* and Paris Smaragdis "Bitwise Neural Networks for Efficient Single-Channel Source Separation," In Proc. *IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA)*, New Paltz, NY, Oct. 15 – 18, 2017 (under review).
- [C027] Lei Jiang, *Minje Kim*, Wujie Wen and Danghui Wang, "XNOR-POP: A Processing-in-Memory Architecture for Binary Convolutional Neural Networks in Wide-IO2 DRAMs," In Proc. *IEEE/ACM International Symposium on Low Power Electronics and Design (ISLPED)*, Taipei, Taiwan, July 24-26, 2017 (accepted).
- [C026] *Minje Kim*, "Collaborative Deep Learning for Speech Enhancement: A Run-Time Model Selection Method Using Autoencoders," In Proc. *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, New Orleans, LA, March 5-9, 2017.
- [C025] Sanna Wager, Liang Chen, *Minje Kim*, and Christopher Raphael, "Towards Expressive Instrument Synthesis Through Smooth Frame-By-Frame Reconstruction: From String To Woodwind," in Proc. *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, New Orleans, LA, March 5-9, 2017.
- [C024] *Minje Kim* and Paris Smaragdis, "Efficient Neighborhood-Based Topic Modeling for Collaborative Audio Enhancement on Massive Crowdsourced Recordings," In Proc. *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Shanghai, China, March 20-25, 2016.
- [C023] *Minje Kim* and Paris Smaragdis, "Adaptive Denoising Autoencoders: A Fine-tuning Scheme to Learn from Test Mixtures," In Proc. *International Conference on Latent Variable Analysis and Signal Separation (LVA/ICA)*, Liberec, Czech Republic, August 25-28, 2015.  
**[Nominated for the Best Student Paper on Audio Signal Processing]**
- [C022] *Minje Kim*, Paris Smaragdis, and Gautham J. Mysore, "Efficient Manifold Preserving Audio Source Separation Using Locality Sensitive Hashing," In Proc. *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Brisbane, Australia, April 19-24, 2015.
- [C021] Yunlong Gao, Shaohan Hu, Renato Mancuso, Hongwei Wang, *Minje Kim*, Poliang Wu, Lu Su, Lui Sha, and Tarek Abdelzaher, "Exploiting Structured Human Interactions to Enhance Estimation Accuracy in Cyber-physical Systems," In Proc. *International Conference on Cyber-Physical Systems (ICCP)*, Seattle, WA, April 14-16, 2015.
- [C020] *Minje Kim* and Paris Smaragdis, "Efficient Model Selection for Speech Enhancement Using a Deflation Method for Nonnegative Matrix Factorization," In Proc. *IEEE Global Conference on Signal and Information Processing (Global SIP)*, Atlanta, GA, December 3-5, 2014.

- [C019] Po-Sen Huang, *Minje Kim*, Mark Hasegawa-Johnson, and Paris Smaragdis, "Singing-Voice Separation From Monaural Recordings Using Deep Recurrent Neural Networks," In Proc. *International Society for Music Information Retrieval Conference (ISMIR)*, Taipei, Taiwan, Oct. 27-31, 2014.
- [C018] Ding Liu, Paris Smaragdis, and *Minje Kim*, "Experiments on Deep Learning for Speech Denoising," In Proc. *Annual Conference of the International Speech Communication Association (Interspeech)*, Singapore, September 14-18, 2014.
- [C017] Po-Sen Huang, *Minje Kim*, Mark Hasegawa-Johnson, and Paris Smaragdis, "Deep Learning for Monaural Speech Separation," In Proc. *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Florence, Italy, MAY 4-9, 2014.  
**[Winner of the Starkey Signal Processing Research Student Grant]**
- [C016] Johannes Traa, *Minje Kim*, Paris Smaragdis, "Phase and Level Difference Fusion for Robust Multichannel Source Separation," In Proc. *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Florence, Italy, MAY 4-9, 2014.
- [C015] Paris Smaragdis and *Minje Kim*, "Non-Negative Matrix Factorization for Irregularly-Spaced Transforms," In Proc. *IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA)*, New Paltz, NY, Oct. 20 – 23, 2013.
- [C014] *Minje Kim* and Paris Smaragdis, "Single Channel Source Separation Using Smooth Nonnegative Matrix Factorization with Markov Random Fields," In Proc. *IEEE International Workshop on Machine Learning for Signal Processing (MLSP)*, Southampton, UK, Sep. 22 – 25, 2013.
- [C013] *Minje Kim* and Paris Smaragdis, "Manifold Preserving Hierarchical Topic Models for Quantization and Approximation," In Proc. *International Conference on Machine Learning (ICML)*, Atlanta, Georgia, Jun. 16 – 21, 2013.
- [C012] *Minje Kim* and Paris Smaragdis, "Collaborative Audio Enhancement Using Probabilistic Latent Component Sharing," In Proc. *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, Vancouver, Canada, May 26 – 31, 2013.  
**[Winner of the Google ICASSP Student Travel Grant]**  
**[Best Student Paper Award in the Audio and Acoustic Signal Processing (AASP) area]**
- [C011] C. Zhang, G.G. Ko, J.W. Choi, S.-N. Tsai, *Minje Kim*, A.G. Rivera, R. Rutenbar, P. Smaragdis, M.S. Park, V. Narayanan, H. Xin, O. Mutlu, B. Li, L. Zhao, M. Chen, and R. Iyer, "EMERALD: Characterization of Emerging Applications and Algorithms for Low-power Devices," In Proc. *IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS)*, Austin, TX, Apr. 21 – 23, 2013.
- [C010] *Minje Kim*, Paris Smaragdis, Glenn G. Ko, and Rob A. Rutenbar, "Stereophonic Spectrogram Segmentation Using Markov Random Fields," In Proc. *IEEE International Workshop on Machine Learning for Signal Processing (MLSP)*, Santander, Spain, Sep. 23 – 26, 2012.
- [C009] *Minje Kim*, Seungkwon Beack, Keunwoo Choi and Kyeongok Kang, "Gaussian Mixture Model for Singing Voice Separation from Stereophonic Music," In Proc. *Audio Engineering Society 43th Conference (AES Conference)*, Pohang, Korea, Sep. 29 – Oct. 1, 2011.
- [C008] *Minje Kim*, Jiho Yoo, Kyeongok Kang and Seungjin Choi, "Blind Rhythmic Source Separation: Nonnegativity and Repeatability," In Proc. *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, Dallas, TX, Mar. 14 – 19, 2010.
- [C007] Jiho Yoo, *Minje Kim*, Kyeongok Kang and Seungjin Choi, "Nonnegative Matrix Partial Co-Factorization for Drum Source Separation," In Proc. *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, Dallas, TX, Mar. 14 – 19, 2010.
- [C006] *Minje Kim*, Seungkwon Beack, Taejin Lee, Daeyoung Jang and Kyeongok Kang, "Segmented Dimensionality Reduction Coding on Frequency Domain Signal," In Proc. *Audio Engineering Society 34th Conference (AES Conference)*, Jeju Island, Korea, Aug. 28 – 30, 2008.
- [C005] *Minje Kim*, Minsik Park, Seung-jun Yang, Ji Hoon Choi and Han-kyu Lee, "System Aspects of TV-Anytime Metadata Codec in a Uni-directional Broadcasting Environment," In Proc. *IEEE International Symposium on Consumer Electronics (ISCE)*, Dallas, TX, Jun. 20 – 23, 2007.

- [C004] Seung-jun Yang, Jung Won Kang, Dong-San Jun, *Minje Kim*, and Han-kyu Lee, "TV-Anytime Metadata Authoring Tool for Personalized Broadcasting Services," In Proc. *IEEE International Symposium on Consumer Electronics (ISCE)*, Dallas, TX, Jun. 20-23, 2007.
- [C003] *Minje Kim* and Seungjin Choi, "ICA-based Clustering for Resolving Permutation Ambiguity in Frequency-Domain Convolutional Source Separation," In Proc. *IEEE International Conference on Pattern Recognition (ICPR)*, Hong Kong, Aug. 20 – 24, 2006.
- [C002] *Minje Kim* and Seungjin Choi, "Monaural Music Source Separation: Sparseness, Nonnegativity and Shift-invariance," In Proc. *International Conference on Latent Variable Analysis and Signal Separation (LVA/ICA)*, pp. 617-624, Charleston, SC, Mar. 5 – 8, 2006. (LNCS 3889).
- [C001] *Minje Kim* and Seungjin Choi, "On Spectral Basis Selection for Single Channel Polyphonic Music Separation," In Proc. *International Conference on Artificial Neural Networks (ICANN)*, Warsaw, Poland, Sep. 11 – 15, 2005. (LNCS 3697).

### The Other Papers

- [M002] *Minje Kim* and Paris Smaragdis, "Bitwise Neural Networks," *International Conference on Machine Learning (ICML) Workshop on Resource Efficient Machine Learning*, Lille, France, Jul. 6-11, 2015
- [M001] *Minje Kim* and Paris Smaragdis, "Collaborative Audio Enhancement: Crowdsourced Audio Recording," *Neural Information Processing Systems (NIPS) Workshop on Crowdsourcing and Machine Learning*, Montreal, Canada, Dec. 8-13, 2014

## 9. SELECTED TALKS & POSTERS

- Department of Statistics Colloquium Series, Indiana University, Bloomington, IN, Oct. 31, 2016
- Intelligent & Interactive Systems Talk Series, School of Informatics and Computing, Indiana University, Bloomington, IN, Oct. 31, 2016
- Graduate School of Culture Technology, KAIST, Daejeon, Korea, Oct. 7, 2016
- Graduate School of Convergence Science and Technology, Seoul National University, Suwon, Korea, Oct. 6, 2016
- Qualcomm Korea, Seoul, Korea, Oct. 6, 2016
- Worldwide Youth in Science and Engineering (WYSE) Summer Camp: Discover Engineering, Urbana, IL, Jun. 27, 2016
- Hanyang University, Seoul, Korea, Apr. 6, 2016
- ETRI, Daejeon, Korea, Mar. 29, 2016
- Naver Labs, Seongnam, Korea, Mar. 29, 2016
- Google, Mountain View, CA, Mar. 9, 2016
- School of Informatics and Computing, Indiana University, Bloomington, IN, Feb. 29, 2016
- Lyric Labs, Analog Devices, Cambridge, MA, Feb. 23, 2016
- Coordinated Science Laboratory Student Conference, Urbana, Feb. 18-19, 2016
- Adobe Research, San Francisco, CA, Feb. 10, 2016
- IBM T. J. Watson Research Center, Yorktown Heights, NY, Jan. 7, 2016
- Speech and Audio in the Northeast (SANE) Workshop, New York, NY, Oct. 22, 2015
- Beckman Graduate Seminar, Urbana, IL, Oct. 14, 2015
- Speech and Audio in the Northeast (SANE) Workshop, New York, NY, Oct. 24, 2013
- Lyric Labs, Analog Devices, Cambridge, MA, Jun. 12, 2012
- Department of Electrical and Computer Engineering, UIUC (with visitors from Sony, Japan), May 10, 2012
- Intel Science and Technology Center – Embedded Computing (ISTC-EC) Workday, Apr. 4-5, 2012
- Sejong University, Seoul, Korea, Jun. 10, 2011

## 10. SELECTED PATENTS

**Named in more than 50 (20 US) patent applications, 10 of which are US patents issued.**

- Minje Kim et al, "Irregular Pattern Identification Using Landmark Based Convolution," US Patent Application (pending), 2013
- Minje Kim et al, "Method and System for Separating Music Sound Source Using Time and Frequency Characteristics," US Patent No. 8,563,842, 2013
- Minje Kim et al, "Method and System for Separating Music Sound Source," US Patent No. 8,340,943, 2012
- Minje Kim et al, "Method and system for separating musical sound source without using sound source database," US Patent No. 8,080,724, 2011
- Minje Kim et al, "Method and System for Unified Source Separation," Korea Patent No. 1013754320000, 2014, US Patent Application (Pending), 2011
- Minje Kim et al, "Apparatus and method for separating sound source," Korea Patent No. 1015274410000, 2015
- Minje Kim et al, "Pattern Matching of Sound Data Using Hashing," US Patent No. 9,449,085, 2016
- Minje Kim et al, "Multichannel Sound Source Identification and Localization," US Patent Application (pending), filed in 2013
- Minje Kim et al, "Sound Data Identification," US Patent No. 9,215,539, 2015.
- Minje Kim et al, "Known information compression apparatus and method for separating sound source," US Patent Application (Pending), 2011

## 11. EXTRACURRICULAR ACTIVITIES

- Some home recordings are available here: [http://minjekim.com/ext\\_acts.html](http://minjekim.com/ext_acts.html)
- The pick of my pics: <https://goo.gl/OWvLRc>