

Byonghyo Shim

curriculum vitae

Contact Information

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Research Summary

My recent research focuses on 5G wireless communications (with emphasis on physical layer), machine type communications for internet of things (IoT), signal processing for machine learning and bigdata.

Educational and Academic Background

- PhD in Electrical and Computer Engineering

Univ. of Illinois at Urbana-Champaign, May 2005

- MS in Mathematics

Univ. of Illinois at Urbana-Champaign, Dec. 2004

- MS in Control and Instrumentation (currently EE)

Seoul National University, Feb. 1997

- BS in Control and Instrumentation (currently EE)

Seoul National University, Feb. 1995

Professional Experience

- Dept. of Electrical and Computer Engineering, Seoul National University, Seoul, Korea

Professor March 2017~ Present

Associate Professor Sept. 2014~ Feb. 2017

- School of Information and Communication, Korea University, Seoul, Korea

Associate Professor Sept. 2011~ Aug. 2014

Assistant Professor Sept. 2007~ Aug. 2011

- Modem group, Qualcomm CDMA Technologies, San Diego, CA

Staff Engineer April 2007~Aug. 2007

Senior Engineer Jan. 2005~March 2007

- DSP R&D Center, Texas Instruments, Dallas, TX

Co-op engineer May 2004~Aug. 2004

- Univ. of Illinois at Urbana-Champaign, Urbana, IL

Research Assistant Aug. 2000~Dec. 2004

- Dept. of Electronics, Korean Air Force Academy, Cheongju, Korea

Full-time Lecturer Sept. 1997~June 2000

Honors and Awards

- **Sinyang Research Award** from Engineering College, Seoul National University (2017)
- **Distinguished teaching Award** from Electrical and Computer Engineering, Seoul National University (2017)
- **Irwin Jacob award** from Qualcomm Inc. and Korean Institute of Communications and Information Sciences (2016)
- **Hadong young engineer award** from Institute of Electronics engineers of Korea (2010)
- **Seoktap award** from Korea University for excellence in teaching (2008, 2009, 2014)
- **IEEE Senior Member** (2009)
- **QCT Super Qualstar award** for contribution on next generation UMTS advanced receiver, Qualcomm Inc. (2006)
- **Qualstar award** for contribution on CDMA interference cancellation, Qualcomm Inc. (2005)
- **M. E. Valkenburg research award** from ECE Dept., University of Illinois at Urbana-Champaign (2005)
- **10th SAMSUNG humantech paper award** (2004)
- **Distinguished teaching award** from Korean Air Force Academy (1999)

Professional Services

- Associate editor
 - IEEE Transactions on Signal Processing (TSP)*, 2017-Present
 - IEEE Wireless Communications Letters (WCL)*, 2013-2016
 - IEEE Journal on Selected Areas in Communications (JSAC)*
(*Special issue in Location-awareness for radios and networks*), 2014-2015
 - Journal of Communications and Networks (JCN)*, 2015-Present
- Technical program committee
 - IEEE Signal Processing Society, SPCOM Technical Committee*, 2017-present
 - IEEE International Conference on Communications (ICC)*, 2011-present
 - IEEE GLOBECOM Conference*, 2010-present
 - IEEE WCNC Conference*, 2013-present
 - IEEE VTC Conference*, 2011
 - Intl. Conf. on Electronics and Information, and Communication (ICEIC)*, 2008
 - IEEE Asia Pacific Wireless Communication Symposium (APWCS)*, 2010-2015
 - IEEE IEEE International Conference on Communications in China (ICCC)*, 2012
- Reviewer of the following journals and conferences
 - IEEE Transactions on Signal Processing*
 - IEEE Transactions on Communications*
 - IEEE Transactions on Wireless Communications*
 - IEEE Transactions on Information Theory*
 - IEEE Journals of Selected Areas in Communications*
 - IEEE Transactions on Vehicular Technology*
 - IEEE transactions on Acoustics Speech and Signal Processing*
 - IEEE/ACM Transactions on Networking*
 - IEEE Signal Processing Letters*
 - IEEE Communication Letters*
 - ICASSP, GLOBECOM, ICC, ISIT, Asilomar, GlobalSIP, VTC, SPAWC, etc.*
- Conference services
 - General secretary of VTC 2014 Spring at Seoul
 - Vice chair of IEEE Communications Society, Asia Pacific Board (IEEE ComSoc APB), Chapter coordination committee
 - Track chair (Wireless communications), Asia-Pacific Conferences on Communications, APCC2017, Perth

- Senior Member of IEEE (signal processing, communication, information theory society)

Research Publications

PDF files available from <http://islab.snu.ac.kr>

† Journals

1. H. Ji, S. Park, and **B. Shim**, "Sparse vector coding for ultra-reliable and low latency communications," submitted to *IEEE Transactions on Wireless Communications*.
2. J. Tang, T. Q. S. Quek, T-H. Chang, and **B. Shim**, "Systematic resource allocation in cloud RAN with caching as a service under two timescale," submitted to *IEEE Journal on Selected Areas in Communications (JSAC)*.
3. L. Nguyen, S. Kim, and **B. Shim**, "Localization of the Internet of Things network using a low-rank matrix completion," submitted to *IEEE Transactions on Signal Processing*.
4. H. Ji, S. Park, J. Yeo, Y. Kim, J. Lee, and **B. Shim**, "Ultra reliable and low latency communications in 5G: Physical layer aspects," submitted to *IEEE Wireless Communications*.
5. W. Shen, L. Dai, **B. Shim**, Z. Wang, and R. Heath, "Channel feedback based on AoD-adaptive subspace codebook in FDD massive MIMO systems," submitted to *IEEE Transactions on Information Theory*.

6. Y. Dong, Z. Chen, J. Wang, and **B. Shim**, "Optimal power control for transmitting correlated source with energy harvesting constraints," to appear in *IEEE Transactions on Wireless Communications*.
7. J. Ahn, **B. Shim**, and K. B. Lee, "Sparsity-aware ordered successive interference cancellation for massive machine-type communications," to appear in *IEEE Wireless Communications Letters*.
8. B. Lee, S. Park, D. Love, and **B. Shim**, "Packet structure and receiver design for low latency wireless communications with ultra short packets," to appear in *IEEE Transactions on Communications*.
9. J. Choi and **B. Shim**, "Detection of large-scale wireless systems via sparse error recovery," *IEEE Transactions on Signal Processing*, vol. 65, pp. 6038-6052, Nov. 2017.
10. J. Wang, F. Wang, Y. Dong, and **B. Shim**, "Oblique projection matching pursuit," *ACM Mobile Networks and Applications*, vol. 22, pp. 377-382, June 2017.
11. J. Choi, **B. Shim**, Y. Ding, B. Rao, and D. Kim, "Compressive sensing for wireless communications : Useful tips and tricks," *IEEE Communications Surveys and Tutorials*, vol. 19, pp. 1527-1550, 2017.
12. S. Park, J. Choi, J. Seol, and **B. Shim**, "Expectation-Maximization-based channel estimation for multiuser MIMO systems," *IEEE Transactions on Communications*, vol. 65, pp. 2397-2410, June 2017.
13. H. Ji, Y. Kim, J. Lee, E. Onggosanusi, Y. Nam, J. Zhang, B. Lee, and **B. Shim** "Overview of Full-dimension MIMO in LTE-Advanced Pro," *IEEE Communications Magazine*, vol. 55, pp. 176-184, Feb. 2017.
14. Y. Dong, J. Wang, and **B. Shim**, "DEARER: A distance-and-energy-aware routing with energy reservation for energy harvesting wireless sensor networks," *IEEE Journal on Selected Areas in Communications (JSAC)*, vol. 34, no. 12, pp. 3798-3813, Dec. 2016.
15. W. Shin, B. Lee, **B. Shim**, and J. Lee, "A MIMO relay with delayed feedback can improve DoF in the K-user MISO interference channel with no CSIT," *IEEE Transactions on Vehicular Technology*. vol. 65, no. 12, pp. 10188-10192, Dec. 2016.
16. J. Lee, J. Choi, and **B. Shim**, "Sparse signal recovery via tree search matching pursuit," *Journal of Communications and Networks*, vol. 18, no. 5, pp. 699-712, Nov. 2016.
17. W. Shen, L. Dai, Y. Shi, **B. Shim**, and Z. Wang, "Joint channel training and feedback for FDD massive MIMO systems," *IEEE Transactions on Vehicular Technologies*, vol. 65, no. 10, pp. 8762-8767, Oct. 2016.
18. J. Wang and **B. Shim**, "Exact recovery of sparse signals using Orthogonal Matching Pursuit: How many iterations do we need?," *IEEE Transactions on Signal Processing*, vol. 64, pp. 4194-4202, Aug. 2016.
19. Z. Gao, L. Dai, W. Dai, **B. Shim**, and Z. Wang, "Structured compressive sensing based spatio-temporal joint channel estimation for FDD massive MIMO," *IEEE Transactions on Communications*, vol. 64, pp. 601-617, Feb. 2016.

20. J. Wang, S. Kwon, P. Li, and **B. Shim**, "Recovery of sparse signals via generalized orthogonal matching pursuit: A new analysis," *IEEE Transactions on Signal Processing*, vol. 64, pp. 1076-1089, Feb. 2016.
21. W. Shen, L. Dai, **B. Shim**, S. Mumtaz, and Z. Wang, "Joint CSIT acquisition based on low-rank matrix completion for FDD massive MIMO systems," *IEEE Communications Letters*, vol. 19, pp. 2178-2181, Dec. 2015.
22. J. Choi, B. Lee, and **B. Shim**, "Iterative group detection and decoding for large MIMO systems," *Journal of Communications and Networks*, vol. 17, pp. 609-621, Dec. 2015.
23. S. Chang, **B. Shim**, and J. Choi, "Downlink pilot reduction for massive MIMO systems via compressed sensing," *IEEE Communications Letters*, vol. 19, pp. 1889-1892, Nov. 2015.
24. T. Duong, M. Elkashlan, G. Karagiannidis, H. Wymeersch, Y. Mostofi, and **B. Shim**, "Guest Editorial: Location-Awareness for radios and networks, Part II," *IEEE Journal on Selected Areas in Communications (JSAC)*, vol. 33, no. 7, pp. 2269-2271, Nov. 2015.
25. J. Choi and **B. Shim**, "Statistical recovery of block-sparse time-varying signals from multiple measurement vectors," *IEEE Transactions on Signal Processing*, vol. 63, no. 22, pp. 6136-6148, Nov. 2015.
26. B. Lee, J. Choi, J. Seol, D. Love, and **B. Shim**, "Antenna grouping based feedback reduction for FDD-based massive MIMO systems," *IEEE Transactions on Communications*, vol. 63, no. 9, pp. 3261-3274, Sept. 2015.
27. T. Duong, M. Elkashlan, G. Karagiannidis, H. Wymeersch, Y. Mostofi, and **B. Shim**, "Guest Editorial: Location-Awareness for radios and networks, Part I," *IEEE Journal on Selected Areas in Communications (JSAC)*, vol. 33, no. 7, pp. 1285-1287, July 2015.
28. S. Park, **B. Shim**, and J. Choi, "Iterative channel estimation using virtual pilot signals for MIMO-OFDM systems," *IEEE Transactions on Signal Processing*, vol. 63, no. 12, pp. 3032-3045, June 2015.
29. **B. Shim**, S. Kwon, and B. Song, "Sparse detection with integer constraint using multipath matching pursuit," *IEEE Communications Letters*, vol. 18, no. 10, pp. 1851-1854, Oct. 2014.
30. S. Kwon, J. Wang, and **B. Shim**, "Multipath matching pursuit," *IEEE Transactions on Information Theory*, vol. 60, no. 5, pp. 2986-3001, May 2014.
31. C. Lim, T. Yoo, B. Clercks, B. Lee, and **B. Shim**, "Recent trend of multiuser MIMO in LTE-Advanced," *IEEE Communications Magazine*, pp. 127-135, March, 2013.
32. J. Wang, S. Kwon, and **B. Shim**, "Generalized orthogonal matching pursuit," *IEEE Transactions on Signal Processing*, vol. 60, no. 12, pp. 6201-6216, Dec. 2012.
33. B. Lee, **B. Shim**, "A vector perturbation with user selection for multiuser MIMO downlink," *IEEE Transactions on Communications*, vol. 60, no. 11, pp. 3322-3331, Nov. 2012.
34. H. Chung, N. Lee, **B. Shim**, and T. Oh, "On the beamforming design for MIMO multi-pair two-way relay channels," *IEEE Transactions on Vehicular Technologies*, vol. 61, no. 7, pp. 3301-3306, Sept. 2012.
35. J. Wang and **B. Shim**, "On the recovery limit of sparse signals using orthogonal matching pursuit," *IEEE Transactions on Signal Processing*, vol. 60, no. 9, pp. 4973-4976, Sept. 2012.
36. J. Lee, **B. Shim**, and I. Kang, "Soft-output list sphere detection with a probabilistic radius tightening," *IEEE Transactions on Wireless Communications*, vol. 11, no. 8, pp. 2848-2857, Aug. 2012.
37. **B. Shim**, J. Choi, and I. Kang, "Towards the performance of ML and the complexity of MMSE - A hybrid approach for multiuser detection," *IEEE Transactions on Wireless Communications*, vol. 11, no. 7, pp. 2508-2519, July 2012.
38. **B. Shim** and B. Song, "Multiuser detection via compressive sensing," *IEEE Communication Letters*, vol. 16, no. 7, pp. 972-974, July 2012.
39. H. Yoo, **B. Shim**, and T. Oh, "Iterative interstream interference cancellation for HSPA+ System," *Journal of Communications and Networks*, vol. 14, no. 3, pp 273-279, June 2012.
40. J. Choi, **B. Shim**, and A. Singer, "Efficient soft-input soft-output tree detection via an improved path metric," *IEEE Transactions on Information Theory*, vol. 58, pp. 1518-1533, March 2012
41. J. Wang, S. Kwon, and **B. Shim**, "Near optimal bound of orthogonal matching pursuit using restricted isometric constant," *Eurasip Journal on Advances in Signal Processing*, Feb. 2012.
42. J. Park, B. Lee, and **B. Shim**, "A MMSE vector precoding with block diagonalization for multiuser MIMO downlink," *IEEE Transactions on Communications*, vol. 60, pp. 569-577, Feb. 2012.
43. B. Lee, J. Yoon, J. Seo, **B. Shim**, Y. Shin, B. Kim, "Fast high-quality volume ray-casting with virtual samplings," *IEEE Transactions on Visualization and Computer Graphics*, vol. 16, pp. 1525-1532, Dec. 2010.

44. J. Choi, **B. Shim**, A. Singer, and N. Cho, "Low-complexity decoding via reduced dimension maximum likelihood search," *IEEE Transactions on Signal Processing*, vol. 58, pp. 1780-1793, March 2010.
45. **B. Shim** and I. Kang, "On further reduction of complexity in tree pruning based sphere search," *IEEE Transactions on Communications*, vol. 58, no. 2, pp. 417-422, Feb. 2010.
46. **B. Shim**, F. Abrishamkar, and I. Kang, "Decision-feedback closest lattice point search for UMTS HSPA system," *IEEE Signal Processing Letters*, vol. 16, pp. 1035-1038, Dec. 2009.
47. **B. Shim**, H. Min, and S. Yoon, "Nonlinear preprocessing method for detecting peaks from experimental data," *BMC Bioinformatics*, pp. 1-10, Nov. 2009.
48. **B. Shim** and I. Kang, "Joint modulation classification and detection using sphere decoding," *IEEE Signal Processing Letters*, vol. 16, pp. 778-781, Sept. 2009.
49. J. Kim, S. Yu, **B. Shim**, H. Kim, H. Min, E. Chung, R. Das, and S. Yoon, "A robust peak detection method for RNA structure inference by high-throughput contact mapping," *Bioinformatics*, vol. 25, no. 9, pp. 1137-1144, Sept. 2009.
50. **B. Shim** and I. Kang, "Sphere decoding with a probabilistic tree pruning," *IEEE Transactions on Signal Processing*, vol. 56, no. 10, pp. 4867-4878, Oct. 2008.
51. J. Choi, **B. Shim**, A. Singer, and N. Cho, "Low-power filtering via minimum power soft error cancellation (MP-SEC)," *IEEE Transactions on Signal Processing*, vol. 55, no. 10, pp. 5084-5096, Oct., 2007.
52. **B. Shim** and N. Shanbhag, "Energy-efficient signal processing in the presence of soft error," *IEEE Transactions on VLSI systems*, vol. 14, no. 4, pp. 336-348, April, 2006.
53. **B. Shim**, S. Sridhara, and N. Shanbhag, "Low-Power digital signal processing via reduced precision redundancy," *IEEE Transactions on VLSI systems*, vol. 12, no. 5, pp. 497-510, May 2004.
54. **B. Shim** and N. Shanbhag, "Complexity analysis of multi-carrier & single-carrier systems for Very-high-speed digital subscriber line," *IEEE Transactions on Signal Processing*, vol. 50, no. 1, pp. 282-293, Jan. 2003.

† Conferences

1. S. Park, H. Seo, H. Ji, and **B. Shim**, "Joint Active User Detection and Channel Estimation for Massive Machine-Type Communications," Proc. of *IEEE workshop on signal processing advances in wireless communications (SPAWC)* 2017.
2. J. Tang, L. Teng, T. Q. S. Quek, T. Chang, and **B. Shim**, "Exploring the interactions of communication, computing and caching in cloud RAN under two timescale," Proc. of *IEEE workshop on signal processing advances in wireless communications (SPAWC)* 2017
3. J. Yoo, J. Bae, S. Lim, S. Kim, J. Choi, and **B. Shim**, "Sampling-based tracking of time-varying channels for millimeter wave-band communications," Proc. of *IEEE international conf. on communications (ICC)* 2017.
4. H. Ji, J. Choi, and **B. Shim**, "Channel sparsification beamforming for Internet-of-Things Systems," Proc. of *IEEE international conf. on communications (ICC)* 2017.
5. W. Kim, J. Kim, **B. Shim**, and D. Park, "Multiple subspace matching pursuit for spectrum sensing," Proc. of *International conf. on acoustics, speech, and signal processing (ICASSP)* 2017.
6. J. Yoo, J. Choi, and **B. Shim**, "Statistical compressed sensing of simultaneously sparse time-varying signals," Proc. of *International conference on communication systems (ICCS)* 2016.
7. B. Lee, S. Park, D. Love, H. Ji, and **B. Shim**, "Packet structure and receiver design for low-latency communications with ultra-small packets," Proc. of *IEEE GLOBECOM conference* 2016.
8. S. Park, J. Choi, J. Seol, and **B. Shim**, "Virtual pilot-based channel estimation and multiuser detection for multiuser MIMO in LTE-Advanced," Proc. of *IEEE Vehicular technology conference (VTC)* 2016.
9. L. Nguyen, S. Kim, and **B. Shim**, "Localization of IoT network using matrix completion," Proc. of *IEEE/CIC International conference on communications in China (CIC/ICCC)* 2016.
10. Y. Dong, J. Wang, and **B. Shim**, "Transmitting correlated sources using energy harvesting transmitter," Proc. of *IEEE/CIC International conference on communications in China (CIC/ICCC)* 2016.
11. B. Lee, D. Love, and **B. Shim**, "Exploiting dominant eigendirections for feedback compression for FDD-based massive MIMO systems," Proc. of *IEEE International conference on communications (ICC)* 2016.
12. S. K. Gonugondla, **B. Shim**, and N. Shanbhag, "Perfect error compensation via algorithmic error cancellation," Proc. of *International conf. on acoustics, speech, and signal processing (ICASSP)*. (**best student paper award in ICASSP16**)

13. L. Nguyen, S. Kim, and **B. Shim**, "Localization of internet of things networks: matrix completion approach," Proc. of *Information Theory and Application Workshop (ITA)* 2016.
14. J. Lee and **B. Shim**, "Greedy Tree Search for Internet of Things (IoT) Signal Detection," Proc. of *IEEE international symposium on information theory (ISIT)* 2015.
15. H. Ji, B. Lee, **B. Shim**, Y. Nam, Y. Kwak, H. Noh, and C. Shin, "3D beamforming for capacity boosting in LTE-Advanced system," Proc. of *IEEE Personal indoor mobile radio communications symposium (PIMRC)* 2015.
16. S. Park, J. Choi, K. Lee, and **B. Shim**, "Soft decision-directed channel estimation for multiuser MIMO systems," Proc. of *IEEE Personal indoor mobile radio communications symposium (PIMRC)* 2015.
17. J. Lee and **B. Shim**, "Sparse symbol detection by a greedy tree search," Proc. of *IEEE international conf. on acoustics, speech, and signal processing (ICASSP)* 2015.
18. J. Choi and **B. Shim**, "Compressive Sensing based pilot reduction technique for massive MIMO systems," Proc. of *Information theory and application workshop (ITA)* 2015.
19. B. Lee and B. Shim, "An efficient feedback compression for large-scale MIMO systems," Proc. of *IEEE Vehicular technology conference (VTC)* 2014.
20. J. Choi and **B. Shim**, "New approach for massive MIMO detection using sparse error recovery," Proc. of *IEEE GLOBECOM conference* 2014.
21. B. Lee, L. Ngo, and **B. Shim**, "Antenna group selection based user scheduling for massive MIMO systems," Proc. of *IEEE GLOBECOM conference* 2014.
22. J. Lee, S. Kwon, and **B. Shim**, "A greedy search algorithm with tree pruning for sparse signal recovery," Proc. of *IEEE International symposium on information theory (ISIT)* 2014.
23. B. Lee, J. Choi, D. Love, J. Seol, and **B. Shim**, "Antenna grouping based feedback reduction technique for FDD-based massive MIMO systems," Proc. of *IEEE International conference on communications (ICC)* 2014.
24. S. Park, J. Choi, J. Seol, and **B. Shim**, "Virtual reference signal for massive MIMO-OFDM systems," Proc. of *Information Theory and Application Workshop (ITA)* 2014.
25. S. Park, B. Lee, and **B. Shim**, "Interference aware node activation for wireless ad hoc networks," Proc. of *IEEE GLOBECOM conference* 2013.
26. S. Kwon, J. Wang, and **B. Shim**, "Sparse signal recovery via multipath matching pursuit," Proc. of *IEEE International symposium on information theory (ISIT)* 2013.
27. J. Choi, B. Lee, **B. Shim**, and I. Kang, "Low complexity soft-input soft-output group detection for massive MIMO systems," Proc. of *IEEE International conference on communications (ICC)* 2013.
28. J. Choi, B. Lee, I. Kang, **B. Shim**, "Low-complexity detection and precoding for massive MIMO systems," Proc. of *IEEE wireless communications and networking conference (WCNC)* 2013.
29. S. Park, B. Lee, J. Wang, and **B. Shim**, "An efficient linear MMSE receiver for wireless Ad Hoc networks," Proc. of *IEEE International conference on communications (ICC)* 2012.
30. H. Chung, N. Lee, **B. Shim** and T. Oh, "Joint Transceiver and Relay Beamforming design for multi-Pair two-way relay systems," Proc. of *IEEE International conference on communications (ICC)* 2012.
31. B. Lee, S. Park, and **B. Shim**, "Transmission capacity of wireless ad hoc network with non-parametric linear MMSE receiver," Proc. of *Information Theory and Application Workshop (ITA)* 2012.
32. J. Wang and **B. Shim**, "Exact reconstruction of sparse signals via generalized orthogonal matching pursuit," Proc. of *Asilomar conference* 2011.
33. **B. Shim** and I. Kang, "Near optimum multiuser detection with closest lattice point search," Proc. of *IEEE International conference on communications (ICC)* 2011.
34. J. Park, B. Lee, and **B. Shim**, "A MMSE vector precoding with block diagonalization for multiuser MIMO downlink," Proc. of *IEEE International conference on communications (ICC)* 2011.
35. B. Lee and **B. Shim**, "A vector perturbation based user selection for multi-antenna downlink channels," Proc. of *Information Theory and Application Workshop (ITA)* 2011.
36. S. Jeong, B. Lee, **B. Shim**, and S. Ko, "Camera network using MIMO Y channel and its application to sports activity analysis," accepted to *Summer School Engage Immersive and Engaging Interaction with VH on Internet (LNCS)* 2010.
37. J. Lee, **B. Shim**, and I. Kang, "List sphere decoding with a probabilistic radius tightening," Proc. of *IEEE GLOBECOM conference* 2010.
38. J. Choi, **B. Shim**, and A. Singer, "On the improved path metric for soft-input soft-output tree detection," Proc. of *IEEE International symposium on information theory (ISIT)* 2010.
39. J. Lee and **B. Shim**, "Low complexity soft sphere decoding via optimal radius control," Proc. of *IEEE Personal indoor mobile radio communications (PIMRC) symposium* 2010.

40. J. Choi, **B. Shim**, J. Nelson, and A. Singer, "Efficient soft-input soft-output MIMO detection via improved M-algorithm," Proc. of *IEEE International conference on communications (ICC)* 2010.
41. B. Lee and **B. Shim**, "A vector perturbation with virtual users for multiuser MIMO downlink," Proc. of *International conf. on acoustics, speech, and signal processing (ICASSP)* 2010.
42. J. Choi, B. Shim, and A. Singer, "On the improved path metric for soft-input soft-output tree detection," Proc. of *Information Theory and Application Workshop (ITA)* 2010.
43. J. Choi, **B. Shim**, and A. Singer, "Near-ML detection over a reduced dimension hypersphere," Proc. of *IEEE GLOBECOM conference* 2009.
44. J. Park and **B. Shim**, "A vector perturbation based transmit diversity scheme for multiuser MIMO systems," Proc. of *IEEE Personal indoor mobile radio communications (PIMRC) symposium* 2009.
45. **B. Shim** and I. Kang, "Joint modulation classification and multi-user detection using multi-modulation sphere decoding," Proc. of *IEEE workshop on signal processing advances in wireless communications (SPAWC)*, vol. 1, pp. 668-671, June 2009.
46. **B. Shim** and I. Kang, "On radius control of tree-pruned sphere decoding," Proc. of *International conf. on acoustics, speech, and signal processing (ICASSP)*, vol. 1, pp. 2469-2472, April 2009.
47. **B. Shim**, J. Choi, and I. Kang, "Towards the Performance of ML and the Complexity of MMSE - A Hybrid Approach," Proc. of *IEEE GLOBECOM conference* vol. 1, pp. 1-5, Dec. 2008.
48. **B. Shim**, B. Lee, and S. Park, "Near ML-achieving Lattice Search for Multiple Antenna Systems," Proc. of *Intl. conf. on electronics and information, and communication (ICEIC)*, pp. 101-104, June 2008.
49. J. Choi, **B. Shim**, A. Singer, and N. Cho, "A low-complexity near-ML decoding technique via reduced dimension list stack algorithm," Proc. of *IEEE sensor array and multichannel signal processing workshop (SAM)*, pp. 41-44, June 2008.
50. **B. Shim** and I. Kang, "Radius adaptive sphere decoding via probabilistic tree pruning," Proc. of *IEEE workshop on signal processing advances in wireless communications (SPAWC)*, Vol. 1, pp. 1012-1015, June 2007.
51. **B. Shim** and H. Myung, "A novel metric representation for low-complexity log-MAP decoder," Proc. of *International symp. on circuits and systems (ISCAS)*, vol. 1, pp. 158-161, May 2005.
52. J. Choi, **B. Shim**, A. Singer, and N. Cho, "A low-power digital filtering via ML-based error-tolerance," Proc. of *International conf. on acoustics, speech, and signal processing (ICASSP)*, vol. 2, pp. 238-241, April 2005.
53. **B. Shim**, M. Zhang and N. Shanbhag, "A novel forward-backward predictor based low-power DSP system," Proc. of *IEEE workshop on signal processing systems and implementation (SiPS)*, vol. 1, pp. 331-336, Oct. 2004.
54. **B. Shim**, N. Shanbhag and S. Lee, "Energy-efficient soft error-tolerant digital signal processing," Proc. of *Asilomar conf.*, pp. 1493-1497, Nov. 2003.
55. **B. Shim** and N. Shanbhag, "Performance analysis of algorithmic noise-tolerance techniques," Proc. of *International symp. on circuits and systems (ISCAS)*, vol. 3, pp. 357-400, May 2003.
56. **B. Shim** and N. Shanbhag, "Reduced-precision redundancy for low-power digital filtering," Proc. of *Asilomar conf.*, vol. 1, pp. 148-152, Nov. 2001 (Invited).
57. **B. Shim** and S. Cho, "An improved VLSI architecture for Viterbi decoder," Proc. of *IEEE TENCON*, vol. 1, pp. 259-262, 1999.
58. **B. Shim** and J. Suh, "Pipelined VLSI architecture of the Viterbi decoder for IMT-2000," Proc. of *IEEE GLOBECOM conf.*, vol. 1a, pp. 158-162, 1999.
59. **B. Shim** and W. Sung, "Adaptive threshold error diffusion technique for color inkjet printing," Proc. of *International conf. on image proc. (ICIP)*, vol. 1, pp. 779-782, 1997.

PATENTS

1. **B. Shim**, B. Lee, T. Kim, and J. Seol, Method and apparatus for grouping antennas in multiple-input-multiple-output antenna system, *U.S. Patent App. 20160233936*.
2. **B. Shim**, S. Park, T. Kim, and J. Seol, Method and apparatus for estimating communication channel in mobile communication systems, *U.S. Patent App. 14609253*.
3. Y. Ki, **B. Shim**, J. Hwang, S. Won, C. Lim, Apparatus and method for interference cancellation in MIMO wireless communication systems, *U.S. Patent 8724685*.
4. I. Kang and **B. Shim**, Apparatus and method for symbol decoding using tree pruning based sphere search, *U.S. Patent 8824604*.

5. **B. Shim** and I. Kang, Systems and methods of classifying and decoding wireless signals, *U.S. Patent App. No. 12683406*.
6. **B. Shim**, Y. Chen, M. Goel, T. Wolf, S. Sundararajan, and A. Gatherer, "A collision avoidance manager, method of avoiding a memory collision and a TURBO decoder employing the same," *U.S. Patent App. 20060083174*.
7. **B. Shim** and I. Kang, "Radius adaptive sphere decoding with probabilistic noise constraint," *U.S. Patent 8290096*.
8. F. Abrishamkar, S. Sambhwani, **B. Shim**, and I. Kang, "Successive equalization and cancellation and successive mini multi-user detection for wireless communication," *U.S. Patent 8781043*.
9. **B. Shim**, F. Abrishamkar, and I. Kang, "Iterative detection and cancellation for wireless communication," *U.S. Patent 7991041*.

Courses Taught (Since 2014)

- 430.523: **Random Signal Theory**(Graduate), Fall 2017
- 430.758: **Special Topics on Signal Processing**(Graduate), Spring 2017
- 430.306: **Signal and Systems**, Spring 2017
- 430.317: **Basics of Communication Systems**, Fall 2016
- 430.523: **Random Signal Theory**(Graduate), Spring 2016
- 430.306: **Signal and Systems**, Spring 2016
- 400.018: **Creative Engineering Design**, Fall 2015
- 430.523: **Random Signal Theory**(Graduate), Spring 2015
- 430.306: **Signal and Systems**, Spring 2015
- 430.758: **Special Topics on Signal Processing**(Graduate), Fall 2014

Supervised Ph.D. Students and Postdocs

- Yunquan Dong, (Research Assistant Prof. 2015~2015) Prof. of Nanjing University of Science and Technology (NUIST), China
- Sunho Park, *A study on channel estimation technique for MIMO communication systems*, (Ph.D., 2015) Samsung Electronics
- Jaeseok Lee, *A study on sparse signal reconstruction using tree search algorithm*, (Ph.D., 2015) Hanhwa systems
- Chaeman Lim, *System capacity enhancement techniques for downlink MIMO systems*, (Ph.D., 2015) Samsung Electronics
- Byungju Lee, *A study on precoding and limited feedback for MIMO communication systems*, (Ph.D., 2014) Samsung Electronics
- Suhyuk (Seokbeop) Kwon, *A study of greedy sparse signal recovery algorithm*, (Ph.D., 2014) Samsung Display
- Jian Wang, *A study of recovery algorithms for compressive sensing*, (Ph.D. 2013), Prof. of Fudan University, China
- Hyoungyoul Yoo, *A study on iterative interference cancellation for linear MMSE receiver*, (Ph.D., 2012) Samsung Electronics
- Hyunjo Chung, *Optimal precoding design for multi-pair MIMO two-way relay systems*, (Ph.D. 2012), Arad networks