Song Noh

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EXPERIENCE

Incheon National University Incheon, South Korea
Assistant Professor Sep. 2018 - Present

- Signal processing algorithm for human-type and machine-type communications
- Design of intelligent wireless communiation systems

Intel Corporation Oregon, USA
Wireless Standards Research Engineer Dec. 2015 - Jul. 2018

- Investigation of the dynamic blockage effects on performance in mmWave
- Development of PHY and MAC algorithm for self-contained and flexible duplex transmission
- Performance analysis of wireless backhaul solution in sub-6GHz and mmWave bands
- Technical contribution to Integrated Access and Backhaul for NR study item

Purdue University Indiana, USA
Research Assistant Jan. 2012 - Dec. 2015

- Multi-resolution codebook and beamforming sequence design in millimeter wave systems
- Pilot beam pattern and hybrid beamforming design in massive MIMO systems
- Precoder design for blind separation and estimation in MIMO-OFDM systems
- Development of a link level simulator based on Digital Video Broadcasting (DVB-T2)

EDUCATION

Purdue University Indiana, USA
Ph.D. in Electrical and Computer Engineering Aug. 2011 – Dec. 2015
Advisors: Professors Michael Zoltowski and David Love

Korea Advanced Institute of Science and Technology (KAIST) Daejeon, South Korea
Master of Science in Electrical Engineering Feb. 2010
Advisor: Professor Youngchul Sung

Soongsil University Seoul, South Korea
Bachelor of Engineering in Electrical Engineering Feb. 2008

PUBLICATIONS

Journal Articles

Song Noh, Junse Lee, Youngchul Sung, and Heejung Yu, "Two-stage channel estimation for IRS-assisted mmWave communication systems based on space-time processing," *submitted to IEEE Trans. Veh. Technol.*, Apr. 2021.

Waqas Khalid, Heejung Yu, Dinh Thuan Do, Zeeshan Kaleem, and **Song Noh**, "RIS-aided physical layer security with full-duplex jamming in underlay D2D networks," *submitted to IEEE Access*, Apr. 2021.

Song Noh, Junse Lee, Gilwon Lee, Kyungsik Seo, Youngchul Sung, and Heejung Yu, "Channel estimation techniques for IRS-assisted millimeter-wave communication," *submitted to IEEE Wireless Commun.*, Mar. 2021.

Song Noh, Heejung Yu, and Youngchul Sung, "Training signal design for sparse channel estimation in intelligent reflecting surface-assisted millimeter-wave communication," *submitted to IEEE Trans. Wireless Commun.*, Dec. 2020.

Song Noh, Jaekoo Lee, Heejung Yu, and Jiho Song, "A new channel estimation with beam squint in hybrid beamforming millimeter wave systems," *submitted to IEEE Systems Journal*, Nov. 2020.

Jaekoo Lee, Myungkeun Yoon and **Song Noh**, "Advanced Network Sampling with Heterogeneous Multiple Chains," *Sensors*, vol. 21, no. 5, pp 6737 – 6751, Mar. 2021.

Song Noh, Hyunchae Chun, "Beamforming algorithms," *J. Korean Inst. Electromagn. Eng. Sci.*, vol. 31, no. 8, pp 701 – 712, Aug. 2020.

Song Noh, Jiho Song, Youngchul Sung, and Heejung Yu, "Fast high-resolution AoA estimation for millimeter-wave hybrid array of subarrays," *IEEE Trans. Wireless Commun.*, vol. 19, no. 10, pp 6737 – 6751, Jul. 2020.

Waqas Khalid, Heejung Yu, and **Song Noh**, "Residual energy analysis in cognitive radios with energy harvesting UAV under reliability and secrecy constraints," *Sensors*, vol. 20, no. 10, May 2020.

Jiho Song, Byungju Lee, **Song Noh**, and Jong-Ho Lee, "Adaptive multiuser transmission using millimeter wave beam alignment with user selection," *IEEE Trans. Veh. Technol.*, vol. 69, no. 8, pp 9140 – 9145, May 2020.

Byounghak Kim, Heejung Yu, **Song Noh**, "Cognitive interference cancellation with digital channelizer for satellite communication," *Sensors*, vol. 20, no. 2, Jan. 2020.

Jiho Song, Byungju Lee, **Song Noh**, and Jong-Ho Lee, "Limited feedback designs for machine-type communications exploiting user cooperation," *IEEE Access*, vol. 7, pp 95154 - 95169, Sep. 2019.

Song Noh, Michael Zoltowski, and David Love, "Multi-resolution codebook and adaptive beamforming sequence design for millimeter wave beam alignment," *IEEE Trans. Wireless Commun.,* vol. 16, no. 9, pp 5689 – 5701, Sep. 2017.

Il Y. Chun, **Song Noh**, David Love, Thomas M. Talavage, Stephen Beckley, and Sherman J. Kisner, "Mean square error (MSE)-based excitation pattern design for parallel transmit and receive SENSE MRI image reconstruction," *IEEE Trans. Comput. Imag.,* vol. 2, no. 4, pp. 424 – 439, Dec. 2016.

Song Noh, Michael Zoltowski, and David Love, "Training sequence design for feedback assisted hybrid beamforming in massive MIMO systems," *IEEE Trans. Commun.,* vol. 61, no. 1, pp 187 – 200, Jan. 2016.

Song Noh, Michael Zoltowski, Youngchul Sung, and David Love, "Pilot beam pattern design for channel estimation in massive MIMO systems," *IEEE J. Sel. Topics Signal Process.,* vol. 8, no. 5, pp. 787 – 801, Oct. 2014.

Song Noh, Youngchul Sung, and Michael Zoltowski, "A new precoder design for blind channel estimation in MIMO-OFDM systems," *IEEE Trans. Wireless Commun.,* vol. 13, no. 12, pp. 7011 – 7024, Dec. 2014.

Conference Papers

Song Noh, Heejung Yu, and Youngchul Sung "Training signal design for sparse channel estimation in millimeter-wave communication with intelligent reflecting surfaces," in *Proc. IEEE ICC,* Montreal, Canada, Jun. 2021.

Kyungsik Seo and **Song Noh**, "A study on the use of deep learning technique for nonlinear system identification," in *Proc. KICS,* Yongpyong, Korea, Feb. 2021.

Kyungsik Seo and **Song Noh**, "Analysis of DNN-based data detection with phase noise for Teraherz OFDM systems," in *Proc. KICS,* Seoul, Korea, Nov. 2020.

Hyeong Sook Park, Eun-Young Choi, Young Seog Song, **Song Noh**, and Kyungsik Seo, "DNN-based phase noise compensation for sub-THz communications," in *Proc. ICTC,* Jeju Island, Korea, Oct. 2020.

Kyungsik Seo and **Song Noh**, "Evaluation of DNN-based channel estimation techniques in millimeter wave systems," in *Proc. KICS,* Yongpyong, Korea, Aug. 2020. (Student Paper Award)

Kyungsik Seo and **Song Noh**, "Performance analysis of beam search techniques in millimeter wave systems," in *Proc. KICS,* Yongpyong, Korea, Feb. 2020.

Song Noh, Kyungsik Seo, Mirae Kim, and Junghwan Im, "Beam misalignment-aware beamforming system design," in *Proc. KICS,* Seoul, Korea, Nov. 2019.

Song Noh, Junghwan Im, Mirae Kim, and Kyungsik Seo, "Beamformed signal classification based on multiple hypothetical testing," in *Proc. KICS,* Jeju, Korea, Jun. 2019.

Song Noh, Dawei Ying, Qian (Clara) Li, Hassan Ghozlan, Apostolos (Tolis) Papathanassiou, and Geng Wu, "System evaluation for millimeter-wave radio access network," in *Proc. IEEE ICC,* Kansas City, MO, May 2018.

Song Noh, Michael Zoltowski, and David Love, "Multi-resolution codebook based beamforming sequence design in millimeter-wave systems," in *Proc. IEEE Globecom,* San Diego, CA, Dec. 2015.

Song Noh, Michael Zoltowski, and David Love, "Downlink training codebook design and hybrid precoding in FDD massive MIMO systems," in *Proc. IEEE Globecom,* Austin, TX, Dec. 2014. (**Best Paper Award**)

Song Noh, Michael Zoltowski, Youngchul Sung, and David Love, "Training signal design for channel estimation in massive MIMO systems," in *Proc. IEEE ICASSP,* Florence, Italy, May 2014.

Song Noh and Michael Zoltowski, "A new precoder design for precoding-based blind channel estimation for MIMO-OFDM systems," in *Proc. IEEE Globecom,* Atlanta, GA, Dec. 2013.

Song Noh and Michael Zoltowski, "Blind separation for precoding-based blind channel estimation for MIMO-OFDM systems," in *Proc. Asilomar,* Pacific Grove, CA, Nov. 2013.

Song Noh, Michael Zoltowski, Youngchul Sung, and David Love, "Optimal pilot beam pattern design for massive MIMO systems," in *Proc. Asilomar,* Pacific Grove, CA, Nov. 2013.

EXTERNAL ACTIVITIES

Technical Committee Activities

- Member, Wireless World Research Form (WWRF), Steering Board — Oct. 2017 - Jul. 2018

Reviewer of Journal and Conference Papers

- IEEE Transactions on Communications, IEEE Transactions on Wireless Communications, IEEE Transactions on Vehicular Technology
- IEEE Communications Letters, IEEE Wireless Communications Letters, IEEE Signal Processing Letters
- IEEE Globecom, IEEE ICC, IEEE WCNC

Invited Talks

- Beamforming tutorial: Algorithms, at The Korean Institute of Electromagnetic Engineering and Science (KIEES) — Jul. 2020
- Array signal processing for enhanced beam management, at The Korean Institute of Communications and Information Sciences (KICS) — Jun. 2019
- Channel estimation initiatives through training signal design in large-scale MIMO, at Soongsil University, Sep. 2014, and at KAIST — Aug. 2014

AWARDS AND HONORS

- Academic Research Award, Incheon National University — 2021
- Next Generation and Standards (NGS) Division Recognition Award, Intel — Q3 2017
- Wireless Communication Research (WCR) Division Recognition Award, Intel — Q1 2017
- IEEE Transactions on Communications Exemplary Reviewer — Apr. 2015
- Silver Prize in the 21st HumanTech Paper Contest sponsored by Samsung — Feb. 2015
- IEEE Global Communications Conference (Globecom) Best Paper Award — Dec. 2014