

- 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 communication 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**
- 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 Terahertz 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