

CONTACT INFORMATION	Ubiquitous Network Laboratory Department of Electrical and Computer Engineering Seoul National University 1 Gwanak-ro, Gwanak-gu Seoul 08826, Korea	<i>US Mobile:</i> +1-(650)-283-8837 <i>KOR Mobile:</i> +82-(10)-4803-5130 <i>Email:</i> swhwang@netlab.snu.ac.kr <i>Url:</i> sunwook-hwang.github.io
RESEARCH INTERESTS	<p>Protocol design for V2X communication and 5G New Radio (NR): 3GPP LTE and NR standard for V2X communication systems, DSRC protocol design</p> <p>Protocol design for LTE in unlicensed spectrum and 5G New Radio (NR): 3GPP LTE and NR standard, synchronization, control signaling, link adaptation, wide-band operation</p> <p>Coexistence issue between heterogeneous wireless networks in unlicensed spectrum (especially, IEEE 802.11 WLAN and LAA): Airtime fairness, channelization, clear channel assessment, hidden node problem, listen-before-talk (LBT)</p> <p>Machine learning: Supervised learning, clustering, convolutional neural network, reinforcement learning</p>	
EDUCATION	<p>Seoul National University, Seoul, Korea</p> <p>Unified Course of M.S. and Ph. D., Department of Electrical and Computer Engineering, Mar. 2016 to present</p> <ul style="list-style-type: none"> • Advisor: Professor Saewoong Bahk (Changed from Sunghyun Choi who was a professor until August of 2019 and is currently a Senior Vice President and Head of Advanced Communications Research Center at Samsung Research) • Ubiquitous Network Laboratory in Seoul National University (NETLAB) • Area of Research: Network Systems & Wireless Communications <p>Pohang University of Science and Technology (POSTECH), Pohang, Korea</p> <p>B.S., Department of Electrical Engineering, in Feb. 2016</p>	
EXPERIENCE	<p>Panasonic USA, Mountain View, CA.</p> <p>Research Intern, May 2019 – Oct. 2019.</p>	
RESEARCH PROJECT	<ul style="list-style-type: none"> • 5G Unmanned Vehicle Research Center funded by the Institute for Information & Communications Technology Promotion, “Research and Education for Integrated Technology of 5G/Autonomous Vehicles,” 2018-2019. - Create MATLAB system level simulator for IEEE 802.11p based on Simulator for Urban MObility (SUMO) vehicle traffic • LG Electronics, “Dual Interface Synchronized Hybrid-V2X Research by Simulation,” 2018. • Institute for Information & communications Technology Promotion grant funded by Ministry of Science, ICT and Future Planning (MSIP) of the Republic of Korea, “Spectrum Sensing and Future Radio Communication Platforms,” 2015–2017. - Implement the USRP LTE-LAA testbed for coexistence with Wi-Fi in 5 GHz • Electronics and Telecommunications Research Institute (ETRI), “Development of Core Technologies for Small-cell Coexistence,” 2015–2017. 	

AWARDS	<ul style="list-style-type: none"> • Second Prize from SNU ECE for graduate deeplearning project “SmartSearch: AIBRIL conversation API & facial keypoints detection for beauty items recommendation system”, Fall. 2017. • First Prize from POSTECH EE for Undergraduate design project, Apr. 2012.
PAPERS	<p>[1] Sunwook Hwang, Seongwon Kim, Hoyoung Yoon, Byungjun Kim, Sunghyun Choi, and Saewoong Bahk, “Beyond Vision: Hidden Car Detector with On-demand Relaying in Vehicular Communications,” submitted to <i>IEEE Trans. Veh. Technol.</i>, Jan. 2020. (Under review)</p> <p>[2] Byungjun Kim, Seongwon Kim, Hoyoung Yoon, Sunwook Hwang, M. Xavier Punithan, Byeong Rim Jo, and Sunghyun Choi, “Nearest-First: Efficient Relaying Scheme in Heterogeneous V2V Communication Environments,” <i>IEEE Access</i>, vol. 7, pp. 23615–23627, Feb. 2019.</p> <p>[3] Sunwook Hwang, Kanjin Yoon, and Sunghyun Choi, “Channel Switching Operation of LTE-LAA in Unlicensed Spectrum,” in <i>Proc. ICTC 2017</i>, Jeju, South Korea, Oct. 18-20, 2017.</p> <p>[4] Kangjin Yoon, Taejun Park, Jihoon Kim, Weiping Sun, Sunwook Hwang, Ingab Kang, and Sunghyun Choi, “COTA: Channel Occupancy Time Adaptation for LTE in Unlicensed Spectrum,” in <i>Proc. IEEE DySPAN 2017</i>, Baltimore, USA, Mar. 2017.</p>
PATENTS	<p>[1] Sunwook Hwang, Seongwon Kim, Hoyoung Yoon, Byungjun Kim, and Sunghyun Choi, “Method and apparatus for communication between vehicles and apparatus for using the same,” Korean Patent 10-1975759, Apr. 2019. US/16/686,519, Nov. 2019.</p> <p>[2] Seungil Park, Sunwook Hwang, Hoyoung Yoon, Byungjun Kim, and Sunghyun Choi, “Method and apparatus for message relaying,” Korean Patent 10-1935230, Dec. 2018. PCT/KR2019/008328, July 2019.</p> <p>[3] Kangjin Yoon, Sunwook Hwang, and Sunghyun Choi, “Method, apparatus and computer readable record media for collision-aware link adaptation through clustering,” Korean Patents Application 10-2018-0018143, filed Feb. 2018, Patent Pending.</p> <p>[4] Kangjin Yoon, Sunwook Hwang, Taejun Park, Jihoon Kim, and Sunghyun Choi, “Method, apparatus and computer readable record media for sharing radio resource on unlicensed band,” Korean Patent 10-1865390, May 2018.</p> <p>[5] Byounghoon Jung, Jihoon Kim, Sunghyun Choi, Seunghoon Park, Jungsoo Jung, Jaehong Yi, Kangjin Yoon, and Sunwook Hwang, “Apparatus and method for operating a plurality of carriers in wireless communication system,” Korean Patents Application 10-2017-0111389, filed Aug. 2017, Patent Pending.</p>
SOFTWARE INTELLECTUAL PROPERTIES	<p>[1] Kangjin Yoon, Sunwook Hwang, Taejun Park, Jihoon Kim, and Sunghyun Choi, “LAA Channal Occupancy Time Adaptation Algorithm for fair coexistence with WLAN,” Korea Copyright Commission C-2017-024231, Oct. 2017.</p> <p>[2] Kangjin Yoon, Sunwook Hwang, Taejun Park, Jihoon Kim, and Sunghyun Choi, “WLAN Saturation Detection Algorithm,” Korea Copyright Commission C-2017-000564, Jan. 2017.</p>

HARDWARE AND
SOFTWARE
SKILLS

Simulation Tools:

- Network Simulator 3 (ns-3)
- MATLAB

Computer Programming:

- C, C++, Python

Desktop Editing and Productivity Software:

- Vim, Visual Studio Code, \TeX (\LaTeX , \BibTeX), Microsoft Office, Gnuplot

TEACHING
EXPERIENCES

Instructor

Department of Electrical and Computer Engineering, Seoul National University

- 400.019A Introduction to Electrical Engineering, Spring 2016.
- 430.469 Networking Protocol Design, Fall 2017.

KICS Invited Instructor

Korean Institute of Communications and Information Sciences (KICS),

- Basic Course for Network Simulation using ns-3. Feb. 2019.
- Basic Course for Network Simulation using ns-3. Feb. 2018.