

CONTACT INFORMATION	Ubiquitous Network Laboratory Department of Electrical and Computer Engineering Seoul National University 1 Gwanak-ro, Gwanak-gu Seoul 08826, Korea	<i>Email:</i> swhwang@netlab.snu.ac.kr <i>Url:</i> sunwook-hwang.github.io
RESEARCH INTERESTS	3D object detection for autonomous vehicles: Semi-supervised learning, distributed learning Protocol design for V2X communication and 5G New Radio (NR): 3GPP LTE and NR standard for V2X communication systems, DSRC protocol design	
EDUCATION	Seoul National University , Seoul, Korea Unified Course of M.S. and Ph. D., Department of Electrical and Computer Engineering, Mar. 2016 to present <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) Pohang University of Science and Technology (POSTECH) , Pohang, Korea B.S., Department of Electrical Engineering, in Feb. 2016	
EXPERIENCE	Panasonic USA , Mountain View, CA. Internship, May 2019 – Oct. 2019.	
RESEARCH PROJECT	<ul style="list-style-type: none"> • National Research Foundation grant funded by the Korea government (MSIT), “Research on distributed learning and extended-vision based 3D object detection model for autonomous driving in 5G networks,” 2020-present. • 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 • 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 	
PAPERS	[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,” <i>IEEE Trans. Veh. Technol.</i> , vol. 69, no. 12, pp. 15177–15187, Dec. 2020. [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.	

- [3] **Sunwook Hwang**, Kanjin Yoon, and Sunghyun Choi, "Channel Switching Operation of LTE-LAA in Unlicensed Spectrum," in *Proc. ICTC 2017*, Jeju, South Korea, Oct. 18-20, 2017.
- [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 *Proc. IEEE DySPAN 2017*, Baltimore, USA, Mar. 2017.
- PATENTS
- [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,"
US 11,032,682 B2, June, 2021.
Korean Patent 10-1975759, Apr. 2019.
- [2] Kangjin Yoon, **Sunwook Hwang**, and Sunghyun Choi, "Method, apparatus and computer readable record media for collision-aware link adaptation through clustering,"
Korean Patent 10-2099376, Apr. 2020.
- [3] 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.
- [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.
- [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.
- SOFTWARE
INTELLECTUAL
PROPERTIES
- [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.
- [2] Kangjin Yoon, **Sunwook Hwang**, Taejun Park, Jihoon Kim, and Sunghyun Choi, "WLAN Saturation Detection Algorithm," Korea Copyright Commission C-2017-000564, Jan. 2017.

HARDWARE AND
SOFTWARE
SKILLS

Computer Programming:

- Python, C, C++

Simulation Tools:

- Network Simulator 3 (ns-3)
- MATLAB

Desktop Editing and Productivity Software:

- Git, Docker, Visual Studio Code, VIM, L^AT_EX

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.