

HYUNGJOO SEO

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INTERESTS	RF/Wireless Integrated Circuits and Systems, Interference Management, Adaptive Filters and Beamformers, Signal Processing/Localization in Wireless/Acoustics, Sensor Fusion, Machine Learning in wireless	
EDUCATION	The University of Illinois (UIUC) , Urbana-Champaign, IL, USA (CGPA:3.57/4.00) Aug 2018- <ul style="list-style-type: none">▪ Ph.D. in Electrical and Computer Engineering (Advisors: Jin Zhou, Romit R. Choudhury)<ul style="list-style-type: none">• Focus: Reconfigurable RF, Interference Cancellation, Non-Line-of-Sight Sensing/Tracking	
	The University of Michigan , Ann Arbor, MI, USA (CGPA:3.893/4.000) Sep 2016 – Jun 2018 <ul style="list-style-type: none">▪ M.S. in Electrical and Computer Engineering (Advisors: Ehsan Afshari, David Blaauw)<ul style="list-style-type: none">• Focus: Automatic Beamforming, Injection-locked Coupled Oscillators, RF Power Receiver	
	Tokyo Institute of Technology (Tokyo Tech) , Tokyo, Japan (CGPA:94.3/100) Apr 2011 – Aug 2013, Sep 2015 – Mar 2016 <ul style="list-style-type: none">▪ B.Eng. in Electrical and Computer Engineering (Summa Cum laude) (Advisors: Makoto Ando, Jiro Hirokawa)<ul style="list-style-type: none">• Early Graduation With Excellence (3-year Graduation)• Korean Mandatory Military Service (2013 - 2015)	
RESEARCH EXPERIENCE	Coordinated Science Laboratory (CSL) , UIUC Jun 2020 – (Advisors: Prof. Romit Roy Choudhury and Prof. Jin Zhou) <ul style="list-style-type: none">▪ Real-time Non-field-of-view tracking/sensing via sensor fusion algorithms.	
	Wireless Microsystems and Circuits Lab (WiMAC Lab) , UIUC Aug 2018 – (Advisor: Prof. Jin Zhou) <ul style="list-style-type: none">▪ Novel interference-tolerant receiver architecture for 5G & software-defined radios.<ul style="list-style-type: none">• Impedance aliasing phenomenon: analysis and derivation on harmonically coupled feedback systems in frequency-translational time-varying mixers.• By avoiding impedance aliasing, a hybrid CMOS-acoustic design for widely-tunable blocker-tolerant RF bandpass filtering Rx front-end is proposed to substantially reduce acoustic filter count. [1, 4, 5] (TSMC65nm)▪ Fully-integrated full-duplex/FDD receiver with self-adaptive self-interference cancellation. [2]<ul style="list-style-type: none">• Software modelling of a wireless QAM transceiver with multi-stage RF and analog self-interference cancellation and hybrid-analog-digital autonomous adaptation loops.• Analysis and implementation of various gradient-descent algorithms on self-interference cancellation.▪ Sub-Nyquist wideband spectrum sensing system using acoustic comb filters. [3]<ul style="list-style-type: none">• Proposed structured sparse recovery algorithm enables accurate detection of densely-filled occupied bands across a wide spectrum sampled significantly below the Nyquist sampling rate.▪ Exploring neural network distillation for direct-RF interference cancellation scheme in full-duplex wireless systems.	
	Research-oriented Course Projects , UIUC Aug 2018 – <ul style="list-style-type: none">▪ DNN Receiver: Replaced existing QAM receiver and decoder with deep neural network-based Rx (ECE598NS)▪ Indoor localization using WLS algorithm for multiple voice assistants with MIC arrays (CS434)	
	Radiation Laboratory (RadLab) , U Michigan Aug 2017 – Aug 2018 (Advisor: Prof. Ehsan Afshari) <ul style="list-style-type: none">▪ A 77-GHz retro-directive transceiver with inter-locked coupled oscillators for self-aligning and self-steering beams among two wireless nodes. (ST130nm)▪ Analysis on human language efficiency as information code with entropy of English, Japanese, Korean, and Mandarin as a communication system by proposing M-PSK equivalent high-order Markov Chain.	
	Michigan Integrated Circuit Laboratory (MICL) , U Michigan Dec 2016 – Aug 2017 (Advisor: Prof. David Blaauw) <ul style="list-style-type: none">▪ Multi-band RF harvester using a hybrid RF-DC & DC-DC converter adaptively controlled by VCO for optimal power delivery point. (TSMC180nm)▪ Q-enhanced amplifier-based RF harvester and analysis on power conversion efficiency.	
	Millimeter-wave EM and Antenna Laboratory , Tokyo Tech Sep 2015 – Jun 2016 (Advisor: Prof. Makoto Ando and Prof. Jiro Hirokawa) <ul style="list-style-type: none">▪ Quadrupled beamforming antenna element number from 32x32 to 64x64 using diffusion-bonding half-etching technique through supportive bridge structures for suppressing structural distortions.	

PUBLICATIONS	<div><div>[1] H. Seo and J. Zhou, "A 2.5-to-4.5-GHz Switched-LC-Mixer-First Acoustic-Filtering RF Front-End Achieving <6dB NF, +30dBm IIP3 at 1xBandwidth Offset," <i>IEEE Radio Frequency Integrated Circuits Symposium (RFIC '20)</i>, Los Angeles, CA, USA, Jun 2020.</div><div>[2] Y. Cao, X. Cao, H. Seo, and J. Zhou, "An Integrated Full-Duplex/FDD Duplexer and Receiver Achieving 100MHz Bandwidth 58dB/48dB Self-Interference Suppression Using Hybrid-Analog-Digital Autonomous Adaptation Loops," <i>IEEE International Microwave Symposium (IMS '20)</i>, Los Angeles, CA, USA, Jun 2020.</div><div>[3] J. Guan, J. Zhang, R. Lu, H. Seo, J. Zhou, S. Gong, and H. Hassanieh, "Efficient Wideband Spectrum Sensing Using MEMS Acoustic Resonators," <i>The 18th USENIX Symposium on Networked Systems Design and Implementation (NSDI '21)</i>, Boston, MA, USA, Apr 2021.</div><div>[4] H. Seo and J. Zhou, "A Mixer-First Acoustic-Filtering Superheterodyne RF Front-End," <i>IEEE Journal of Solid-State Circuits (JSSC)</i>, (Invited from RFIC 2020 paper, Minor revision).</div><div>[5] H. Seo, M. Sha, and J. Zhou, "A 3.5-to-6.2-GHz Mixer-First Acoustic-Filtering Receiver Chipset with Mixed-Domain Asymmetric IF and Complex BB Recombination Achieving 170MHz BW and +27dBm IIP3 at 1xBW offset," to appear at <i>IEEE Radio Frequency Integrated Circuits Symposium(RFIC '21)</i>, Atlanta, GA, USA, Jun 2021.</div></div>
AWARDS & SCHOLARSHIPS	<div><div><div>▪ Recipient of PhD Student Sponsorship Initiative by IEEE RFIC/IMS 2019 at Boston</div><div>2019</div></div><div><div>▪ Recipient of Kwanjeong Educational Foundation Scholarship (17th)</div><div>2018– 2022</div></div><div><div>▪ Recipient of U Michigan ECE Departmental Fellowship for 3 semesters</div><div>2016– 2017</div></div><div><div>▪ Selected as a representative of Tokyo Tech, Academic Excellence Award upon graduation.</div><div>2016</div></div><div><div>▪ 3-Year Graduation with Excellence at Tokyo Tech (One of the very few achieved cases in Tokyo Tech history.)</div><div>2016</div></div><div><div>▪ Recipient of Korea-Japan Joint Government Scholarship (11th).</div><div>2010 – 2016</div></div></div>
PROFESSIONAL AFFILIATIONS & ACTIVITIES	<div><div><div>▪ Teaching Assistant (TA): Electronic Circuits (ECE342) at UIUC</div><div>Spring 2020</div></div><div><div>▪ Teaching Assistant (TA): Radio-frequency IC design (ECE498JZ) at UIUC</div><div>Fall 2020</div></div><div><div>▪ Vice president of University of Michigan Korean EECS student association. [Link]</div><div>2016 – 2017</div></div><div><div>▪ Co-organizer of the 1st ASPIRE League E-Olympics at KAIST, South Korea. [Link]</div><div>Aug 2014</div></div><div><div>▪ Member of Team Tokyo Tech, BIOMOD 2013 (Biomolecular Design Competition)</div><div>Jun 2013</div></div><div><div>▪ Director and Editor of a Youtube video clip of 170K views of Tokyo Tech [Link]</div><div>Feb 2013</div></div><div><div>▪ President of Tokyo Tech International Student Association (TISA) [Link]</div><div>Feb 2012 – Jul 2013</div></div></div>
KEY COURSES	<div><div>UIUC</div><div><div>▪ Mobile Computing, Advanced Wireless Networks & Sensing, Random Process</div><div>▪ Machine Learning, Deep Learning in HW, Detection and Estimation Theory</div><div>▪ Advanced Analog IC Design, Radio-Frequency IC & System Design, Advanced Signal Integrity</div></div></div> <div><div>U Michigan</div><div><div>▪ Analog/Digital Interfaces, Analog IC Design, VLSI Design I</div><div>▪ Electromagnetic Theory, Digital Communication & Coding</div></div></div>
LANGUAGE &SKILLS	<div><div>Language</div><div><div>▪ Korean(Native), English(Fluent), Japanese(Bilingual), Chinese(Beginner), German(Limited)</div></div></div> <div><div>Programming</div><div><div>▪ Python, MATLAB, C++, \LaTeX, CSS/HTML</div></div></div> <div><div>Framework</div><div><div>▪ PyTorch, TensorFlow, Scipy, SciKit(DSP, Comm), pandas</div></div></div> <div><div>Tools/Equipment</div><div><div>▪ Cadence Virtuoso, HFSS, ADS, PCB Design tools, VNA, Signal/Spectral Analyzer</div></div></div>