

HYUNGJOO SEO

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INTERESTS	RF/Wireless Integrated Circuits and Systems, Interference Management and Blind Source Separation, Adaptive Filters and Beamformers, Signal Processing/Machine Learning algorithms in Wireless/Acoustics	
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, <ul style="list-style-type: none">▪ B.Eng. in Electrical and Computer Engineering (Summa Cum laude) Sep 2015 – Mar 2016<ul style="list-style-type: none">• Early Graduation With Excellence (3-year Graduation) (Advisors: Makoto Ando, Jiro Hirokawa)• 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">▪ Blind source separation algorithms for real-time Non-field-of-view tracking/sensing.	
	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">• Analysis and simulation of various gradient-descent algorithms for self-interference cancellation in software-modelled QAM transceiver with RF and analog hybrid-analog-digital autonomous adaptation loops.▪ Sub-Nyquist wideband spectrum sensing system using acoustic comb filters. [3]<ul style="list-style-type: none">• Sparse recovery algorithm enabling detection of densely-occupied bands across a wide spectrum sampled significantly below the Nyquist sampling rate.▪ CADELAC(Commutated-Circuit-and-Acoustic-Delay-Line-based Adaptive Canceller) - QIF2021 Finalist<ul style="list-style-type: none">• Explored DNN distillation for direct-RF adaptive interference cancellation scheme in full-duplex wireless systems to overcome non-idealities from frequency-translational acoustic delay lines.	
	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 injection-locked coupled oscillators for self-aligning and self-steering beams to provide robust links among 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. And analyzed power conversion efficiency of amplifier-first RF harvester. (TSMC180nm)	
	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 by suppressing structural distortions via supportive bridge configurations using diffusion-bonding half-etching technique. (simulated and measured)	

PUBLICATIONS	<ul style="list-style-type: none"> [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. [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. [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. [4] H. Seo and J. Zhou, "A Mixer-First Acoustic-Filtering Superheterodyne RF Front-End," to appear at <i>IEEE Journal of Solid-State Circuits (JSSC)</i>, May 2021. (Invited from RFIC 2020 paper). [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," <i>IEEE Radio Frequency Integrated Circuits Symposium (RFIC '21)</i>, Atlanta, GA, USA, Jun 2021. 	
HONORS & AWARDS	<ul style="list-style-type: none"> ▪ Finalist team of <u>Qualcomm Innovation Fellowship Award (QIF)</u> - Team CADELAC 2021 ▪ Recipient of PhD Student Sponsorship Initiative by IEEE RFIC/IMS 2019 at Boston 2019 ▪ Recipient of <u>Kwanjeong Educational Foundation Scholarship (17th)</u> 2018– 2022 ▪ Recipient of U Michigan ECE Departmental Fellowship for 3 semesters 2016– 2017 ▪ Selected as a representative of Tokyo Tech, <u>Academic Excellence Award</u> upon graduation. 2016 ▪ 3-Year Graduation with Excellence at Tokyo Tech 2016 (One of the very few achieved cases in Tokyo Tech history.) ▪ Recipient of <u>Korea-Japan Joint Government Scholarship (11th)</u>. 2010 – 2016 	
PROFESSIONAL AFFILIATIONS & ACTIVITIES	<ul style="list-style-type: none"> ▪ Teaching Assistantship (TA) @ UIUC: <ul style="list-style-type: none"> • Communication Networks (CS438) Fall 2021 • Radio-Frequency IC design (ECE498JZ), Electronic Circuits (ECE342) Fall/Spring 2020 ▪ President of UIUC Korean ECE student association. Fall 2021- ▪ Vice president of University of Michigan Korean EECS student association. [Link] 2016 – 2017 ▪ Co-organizer of the 1st ASPIRE League E-Olympics at KAIST, South Korea. [Link] Aug 2014 ▪ Member of Team Tokyo Tech, BIOMOD 2013 (Biomolecular Design Competition) Jun 2013 ▪ Director and Editor of a Youtube video clip of 170K views of Tokyo Tech [Link] Feb 2013 ▪ President of Tokyo Tech International Student Association (TISA) [Link] Feb 2012 – Jul 2013 	
KEY COURSES	<p>UIUC</p> <ul style="list-style-type: none"> ▪ Mobile Computing, Advanced Wireless Networks & Sensing, Random Process, Information Theory ▪ Machine Learning (ML), ML for Signal Processing, Deep Learning in HW, Detection and Estimation Theory ▪ Advanced Analog IC Design, Radio-Frequency IC & System Design, Advanced Signal Integrity <p>U Michigan</p> <ul style="list-style-type: none"> ▪ Analog/Digital Interfaces, Analog IC Design, VLSI Design I ▪ Electromagnetic Theory, Digital Communication & Coding 	
LANGUAGE & SKILLS	<p>Language</p> <ul style="list-style-type: none"> ▪ Korean(Native), English(Fluent), Japanese(Bilingual), Chinese(Beginner), German(Limited) <p>Programming</p> <ul style="list-style-type: none"> ▪ Python, MATLAB, C++, L^AT_EX, CSS/HTML <p>Framework</p> <ul style="list-style-type: none"> ▪ PyTorch, TensorFlow, Scipy, SciKit(DSP, Comm), CVXPY <p>Tools/Equipment</p> <ul style="list-style-type: none"> ▪ Cadence Virtuoso, HFSS, ADS, PCB Design tools, VNA, Signal/Spectral Analyzer 	