

## Work Experience

- 2019.12 – Now Director of Engineering at Speedlink Technology Inc.  
**Focus: Mm-Wave 5G Broadband IC Chip and Active Antenna System**

## Education

- 2014.08 – 2019.10 Ph.D. in Electrical and Computer Engineering (ECE), Georgia Institute of Technology, USA  
Thesis Title **New System Architecture for Next-Generation Wideband Ultra-Reliable Low-Latency Communications**  
Advisor Prof. Hua Wang
- 2009.09 – 2013.06 B.S. in Electrical Engineering and Computer Science (EECS), National Tsing Hua University (NTHU), Taiwan  
GPA 3.92/4.00 (92.55/100), **Ranked #1**

## Honors and Awards

- 2019.05 **Marconi Society Paul Baran Young Scholar Award (recipient)**
- The Paul Baran Young Scholar Award recognizes young scientists and engineers who are under 28 years old and have demonstrated exceptional capabilities and potentials. The Young Scholars are selected worldwide with only 3 awardees in 2019. I am honored to be the first Georgia Tech Ph.D. student and the first Taiwanese to receive this prestigious award.
- 2019.02 **IEEE Solid-State Circuits Society (SSCS) Predoctoral Achievement Award (recipient)**
- Highest student honor from the IEEE SSC society.
- 2018.06 **IEEE Microwave Theory and Techniques Society (MTT-S) Graduate Fellowship (recipient)**
- Highest student honor from the IEEE MTT society and the only recipient from Georgia Tech.
- 2017.05 **IEEE Custom Integrated Circuits Conference (CICC) Best Conference Paper Award (co-recipient, 1<sup>st</sup> place)**
- Top 1 paper among all the paper categories in CICC 2017
- 2017.02 **ISSCC Analog Devices Inc. Outstanding Student Designer Award (recipient)**
- 2017.01 – 2017.12 **Georgia Tech Power Deliver for Electronic Systems IAB Best Poster Awards (recipient, 1<sup>st</sup> place)**
- 2016.05 **IEEE Radio Frequency Integrated Circuits (RFIC) Best Student Paper Award (recipient and leading author)**
- The top 3 student papers selected from about 100 student papers submitted to RFIC
- 2016.05 **IEEE MTT-S PhD Student Sponsorship Initiative (recipient)**
- 2016.01 – 2016.12 **Georgia Tech Power Deliver for Electronic Systems IAB Best Poster Awards (recipient, 1<sup>st</sup> place)**
- 2015.09 **Georgia Tech Power Delivery for Electronics Systems Best Poster Award (recipient, 1<sup>st</sup> place)**
- 2013 **Scholarship of the Outstanding Student in Engineering, Chinese Institute of Engineers**
- The only recipient for entire NTHU students to receive the prestigious award and there are only 10 representatives from Taiwan, which is a highest honor for undergraduate students in Taiwan.
- 2012 **Scholarship of the Pan Wen-Yuan Foundation**
- Awarded by the Industrial Technology Research Institute (ITRI), Hsinchu, Taiwan and chosen to be the only student in the NTHU EECS Department to receive this merit-based scholarship.
- 2012 **Outstanding Student Scholarship of Department of EECS, NTHU**
- Awarded for academic achievements during academic year 2009 – 2011
- 2010 – 2013 **President's Awards**
- Given to a student with ranked #1 each semester

## Research Interests

- Low-Latency MIMO for Autonomous Unknown Signal Tracking and Blocker Rejection
- Energy-Efficient RF/mm-Wave/THz Integrated Circuits and Systems
- Fiber-Wireless Networks, Radio over Fiber systems
- Broadband THz Hyperspectral Imaging
- Novel electromagnetic structures, Coupler, Beam-Former, and Mode-Former

2015-Present

## Professional Activities

### Paper Reviewer

- IEEE Journal of Solid-State Circuits (JSSC)
- IEEE Transactions on Microwave Theory and Techniques (TMTT)
- IEEE Microwave and Wireless Components Letters (MWCL)
- IEEE International Solid-State Circuits Conference (ISSCC)
- IEEE Radio Frequency Integrated Circuits Conference (RFIC)
- IEEE Custom Integrated Circuits Conference (CICC)

## Research Skills

Signal Processing: Digital & adaptive signal processing, algorithm design & verification using MATLAB and C  
Antenna & Circuits & Systems: Microelectronics, design of mixed-mode/analog/RF/Mm-Wave/THz circuits and systems (H-SPIICE, Laker ADP, Cadence Virtuoso, Verilog), digital VLSI systems (Verilog HDL), ADS, HFSS

## Publication List

### 1. Journal Publications

(Multiple JSSC, TMTT, JLT)

- [J-1] **M. Huang**, T. Chi, S. Li, T. Huang, and H. Wang, "A 24.5-43.5GHz Ultra-Compact CMOS Receiver Front-End with Calibration-Free Instantaneous Full-Band Image Rejection for Multiband 5G Massive MIMO," *IEEE J. of Solid-State Circuits*, Jan. 2020. (invited)
- [J-2] **M. Huang**, Y. Chen, P. Peng, H. Wang and G.-K. Chang, "A Full Field-of-View Self-Steering Beamformer for 5G Mm-Wave Fiber-Wireless Mobile Fronthaul," *IEEE J. of Lightwave Technology*, Nov. 2019.
- [J-3] **M. Huang**, and H. Wang, "A Mm-Wave Wideband MIMO RX with Instinctual Array-Based Blocker/Signal Management for Ultra-Low-Latency Communication," *IEEE J. of Solid-State Circuits*, Dec. 2019. (invited)
- [J-4] S. Li, T. Chi, T. Huang, **M. Huang**, D. Jung, and H. Wang, "A Buffer-Less Wideband Frequency Doubler in 45nm CMOS-SOI with Transistor Multi-Port Waveform Shaping Achieving 25% Drain Efficiency and 46-89GHz Instantaneous Bandwidth," *IEEE Solid-State Circuits Lett.*, May. 2019.
- [J-5] **M. Huang**, T. Chi, F. Wang, T. Li, and H. Wang, "Hybrid Beamformer Array with Full-FoV Dynamic and Autonomous Unknown Blockers Rejection and Signals Tracking for Low-Latency 5G/Mm-Wave Communication," *IEEE Trans. Microw. Theory. Tech.*, Apr. 2019. – **IEEE TMTT Special Issue on "5G Hardware and System Technologies"**.
- [J-6] T. Li, **M. Huang**, and H. Wang, "Millimeter-Wave Continuous-Mode Power Amplifier for 5G MIMO Applications," *IEEE Trans. Microw. Theory. Tech.*, Apr. 2019. – **IEEE TMTT Special Issue on "5G Hardware and System Technologies"**.
- [J-7] **M. Huang**, T. Chi, F. Wang, and H. Wang, "An All-Passive Negative Feedback Network for Broadband and Wide Field-of-View Self-Steering Beam-Forming with Zero DC Power Consumption," *IEEE J. of Solid-State Circuits*, vol. 52, no. 5, pp. 1260 - 1273, May 2017. (invited)

### 2. Conference Publications

(Authored/Co-Authored 8 ISSCC, RFIC Best Student Paper, CICC Best Paper, OFC Top-Scored Paper)

- [C-1] **M. Huang**, Y. Chen, R. Shiu, H. Wang, G. K. Chang, "Wide FoV Autonomous Beamformer Supporting Multiple Beams and Multi-Band Operation for 5G Mobile Fronthaul," accepted and to appear in Proc. Optical Fiber Communication Conference (OFC), Mar. 2020. — **OFC 2020 Top-Scored paper**
- [C-2] A. Amr, **M. Huang**, and H. Wang, "Mixer-First Extremely Wideband 43-97 GHz RX Frontend with Broadband Quadrature Input Matching and Current Mode Transformer-Based Image Rejection for Massive MIMO Applications," accepted and to appear in Proc. *IEEE Custom Integrated Circuits Conference (CICC)*,

Mar. 2020.

[C-3] S. Li, **M. Huang**, D. Jung, T. Huang, and H. Wang, "A 28GHz Current-Mode Inverse-Outphasing Transmitter Achieving 40%/31% PA Efficiency at Psat/6dB PBO and Supporting 15Gbit/s 64QAM for 5G Communication," *IEEE International Solid-State Circuits Conference (ISSCC) Dig. Tech. Papers*, Feb. 2020.

[C-4] N. Mannem, **M. Huang**, T. Huang, S. Li, and H. Wang, "A Reconfigurable Series/Parallel Quadrature Coupler Doherty PA in CMOS-SOI with VSWR Resilient Linearity and Back-Off PAE for 5G MIMO Arrays," *IEEE International Solid-State Circuits Conference (ISSCC) Dig. Tech. Papers*, Feb. 2020.

[C-5] S. Li, T. Chi, D. Jung, T. Huang, **M. Huang**, and H. Wang, "An E-Band HighLinearity Antenna-LNA Frontend with 4.8dB NF and 2.2dBm IIP3 Exploiting Multi-Feed On-Antenna Noise-Canceling and Gm-Boosting," *IEEE International Solid-State Circuits Conference (ISSCC) Dig. Tech. Papers*, Feb. 2020.

[C-6] A. Amr, **M. Huang**, and H. Wang, "A Passive Extremely Wideband RX Frontend in CMOS SOI for Massive MIMOs," accepted and to appear in *Proc. the Government Microcircuit Applications and Critical Technology Conference (GOMACTech)*, Mar. 2020.

[C-7] **M. Huang**, T. Chi, F. Wang, S. Li, T. Huang, and H. Wang, "A 24.5-43.5GHz Compact RX with Calibration-Free 32-56dB Full-Frequency Instantaneously Wideband Image Rejection Supporting Multi-Gb/s 64-QAM/256-QAM for Multi-Band 5G Massive MIMO" *Proc. IEEE Radio Frequency Integrated Circuits (RFIC)*, June. 2019.  
— **2019 RFIC Best Student Paper Award Finalist**

[C-8] **M. Huang**, T. Huang, M. Swaminathan, and H. Wang, "Ultra-Compact Concurrent Multi-Directional Beamforming Receiving Network for High-Efficiency Wireless Power Transfer" *Proc. IEEE International Microwave Symposium (IMS)*, June. 2019.

[C-9] S. Lee, **M. Huang**, Y. Youn, and H. Wang, "A 15 – 55 GHz Low-Loss Ultra-Compact Folded Inductor-Based Multi-Section Wilkinson Power Divider for Multi-Band 5G Applications" *Proc. IEEE International Microwave Symposium (IMS)*, June. 2019.

[C-10] T. Yang, **M. Huang**, Y. Chen, P. Peng, H. Wang and G. Chang, "A 4-channel Beamformer for 9-Gb/s MMW 5G Fixed-wireless Access over 25-km SMF with Bit-loading OFDM," *Proc. Optical Fiber Communication Conference (OFC)*, March. 2019.

[C-11] **M. Huang** and H. Wang, "A Wideband 27-41GHz N-Input-N-Output MIMO Receiver Using Scalable Cascadable Autonomous Array-Based High-Order Spatial Filters for Instinctual Full-FoV Multi-Blocker Suppression and Signal Beamforming," *Proc. the Government Microcircuit Applications and Critical Technology Conference (GOMACTech)*, Mar. 2019.

[C-12] **M. Huang** and H. Wang, "A 27-41GHz MIMO Receiver with N-Input-N-Output Using Scalable Cascadable Autonomous Array-Based High-Order Spatial Filters for Instinctual Full-FoV Multi-Blocker/Signal Management," *IEEE International Solid-State Circuits Conference (ISSCC) Dig. Tech. Papers*, Feb. 2019.

[C-13] E. Garay, **M. Huang**, and H. Wang, "A Cascaded Self-Similar Rat-Race Hybrid Coupler Architecture and its Compact Fully Integrated Ka-band Implementation," *Proc. IEEE International Microwave Symposium (IMS)*, Jun. 2018.

[C-14] **M. Huang** and H. Wang, "Scalable Wideband Hybrid Beam-Forming MIMO Receiver Array with Multi-Stage Closed-Loop Beam-Formers for Full-FoV Dynamic and Autonomous Unknown Blocker Rejection and Signal Tracking," *Proc. the Government Microcircuit Applications and Critical Technology Conference (GOMACTech)*, Mar. 2018.

[C-15] **M. Huang**, T. Chi, F. Wang, T. Li, and H. Wang, "A 23-30GHz Hybrid Beam-Forming MIMO Receiver Array with Closed-Loop Multi-Stage Front-End Beam-Formers for Full-FoV Dynamic and Autonomous Unknown Signal Tracking and Blocker Rejection," *IEEE International Solid-State Circuits Conference (ISSCC) Dig. Tech. Papers*, Feb. 2018.

[C-16] T. Li, **M. Huang**, and H. Wang, "A Continuous-Mode Harmonically-Tuned 19-29.5GHz Ultra-Linear PA Supporting 18Gbit/s at 18.4% Modulation PAE and 43.5% Peak PAE," *IEEE International Solid-State Circuits Conference (ISSCC) Dig. Tech. Papers*, Feb. 2018.

[C-17] H. Wang, S. Hu, T. Chi, F. Wang, S. Li, **M. Huang**, and J. Park, "Towards Energy-Efficient 5G Mm-Wave Links: Exploiting Broadband Mm-Wave Doherty Power Amplifier and Multi-Feed Antenna with Direct On-Antenna Power Combining (Invited)," accepted and to appear in Proc. IEEE Bipolar/BiCMOS Circuits and Technology Meeting (BCTM), Sep. 2017.

[C-18] T. Chi, H. Wang, **M. Huang**, F. Dai, and H. Wang, "A Bidirectional Lens-Free Digital-Bits-In/Out 0.57mm<sup>2</sup> Terahertz Nano-Radio in CMOS with 49.3mW Peak Power Consumption Supporting 50cm Internet-of-Things Communication," *Proc. IEEE Custom Integrated Circuits Conference (CICC)*, May 2017. — **2017 IEEE CICC Best Conference Paper Award (Top 1 paper among all the paper categories in CICC 2017)**

[C-19] T. Chi, **M. Huang**, S. Li, H. Wang, "A Packaged 90-to-300GHz Transmitter and 115-to-325GHz Coherent Receiver in CMOS for Full-Band Continuous-Wave Mm-Wave Hyperspectral Imaging," *IEEE International Solid-State Circuits Conference (ISSCC) Dig. Tech. Papers*, Feb. 2017.

[C-20] T. Chi, F. Wang, S. Li, **M. Huang**, J. Park, and H. Wang, "A 60GHz On-Chip Linear Radiator with Single-Element 27.9dBm Psat and 33.1dBm Peak EIRP Using Multi-Feed Antenna for Direct On-Antenna Power Combining," *IEEE International Solid-State Circuits Conference (ISSCC) Dig. Tech. Papers*, Feb. 2017

[C-21] **M. Huang** and H. Wang, "An All-Passive Negative Feedback Network for Broadband and Full Field-of-View Self-Steering Beam-Forming with Zero DC Power Consumption," *Proc. the Government Microcircuit Applications and Critical Technology Conference (GOMACTech)*, Mar. 2017.

[C-22] E. Garay, **M. Huang**, and H. Wang, "A Cascaded Rat-Race Hybrid Coupler Architecture and its Compact Ka-band Implementation," *Proc. the Government Microcircuit Applications and Critical Technology Conference (GOMACTech)*, Mar. 2017.

[C-23] **M. Huang**, T. Chi, and H. Wang, "A 5GHz All-Passive Negative Feedback Network for RF Front-End Self-Steering Beam-Forming with Zero DC Power Consumption," *Proc. IEEE Radio Frequency Integrated Circuits (RFIC)*, May 2016. — **2016 RFIC Best Student Paper Award (2<sup>nd</sup> Place)**

[C-24] **M. Huang** and H. Wang, "An Ultra-Compact Folded Inductor Based Mm-Wave Rat-Race Coupler in CMOS," *Proc. IEEE International Microwave Symposium (IMS)*, May 2016.

[C-25] Y. Wang, E. Hardy, T. Chi, **M. Huang**, H. Wang, A. Brown, T. Barker, and W. A. Lam, "Electrical-Wound Dressing Demonstrates That Low-Voltages Augment Hemostasis and Clot Formation," *BMES Annual Meeting*, Oct. 2015.

### 3. Patents

[P-1] US Patent 10,536,182, "Bidirectional Oscillator-Based Radio with Integrated Antenna".

[P-2] US Patent App. 15/993,580, "Wideband low noise amplifier (Lna) with a reconfigurable bandwidth for millimeter-wave 5g communication".

[P-3] US Patent App. 15/980,391, "Compact broadband receiver for multi-band millimeter-wave 5g communication".

[P-4] US Patent App. 16/414,480, "Broadband receiver for multi-band millimeter-wave wireless communication".

[P-5] US Patent 10,411,745, "Broadband image-reject receiver for multi-band millimeter-wave 5G communication".

[P-6] US Patent 10,382,084, "Wideband matching co-design of transmit/receive (T/R) switch and receiver frontend for a broadband MIMO receiver for millimeter-wave 5G communication".