

# YAN HE

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## CURRENT RESEARCH FOCUS

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**Low Power ASIC Design, Digital and Mixed-signal Circuits, Power Management Circuits, Hardware Security**

## EDUCATION

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### Rice University

Doctor of Philosophy

Department of Electrical and Computer Engineering

*Aug. 2018 - Present*

### Zhejiang University

Bachelor of Science

Department of Electronic Science and Technology

*Sept. 2014 - Jun. 2018*

## RESEARCH EXPERIENCE

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### Research Assistant at Rice University

Advisor: Kaiyuan Yang, Rice University

*Sep. 2018 - Present*

- **An ultra-low BER PUF with Automatic Self-Checking and Healing (ASCH) system**
  - Design low power and area Physically Uncloneable Function (PUF) array, and reduce its Bit Error Rate (BER) to below  $3E-8$  through efficient and effective cell reconfiguration and masking using ASCH. Went through the entire simulation, tapeout in 65nm and measurement process
- **PUF-Controlled Transmitter for Physical-Layer Identification**
  - Design a PUF to control the input bias of a Power Amplifier (PA), changing the output spectrum of the transmitter to enable physical-layer identification. And to counter the effect of PA's transfer function, simulate and implement ROM to flatten the output distribution in the spectrum of interest
- **A side-channel attack resistant digital LDO achieving state-of-the-art voltage regulation performance**
  - Design a digital-LDO with an asynchronous and nonlinear ADC (Edge-Chasing Quantizer, ECQ) for side-channel resistance and fast voltage regulation, and a second-path boosting circuit for fast droop recovery. LFSRs are used for additional randomization

### Research Intern at University of Michigan

Advisor: Michael P. Flynn, University of Michigan

*Jul. 2017 - Nov. 2017*

- **A 2-beam 8-element digital-to-RF beam-forming transmitter**
  - Complete the testing process, including PCB designing, FPGA programming, signal recording and data processing

## PUBLICATION

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1. **Y. He\***, D. Li\*, Z. Yu and K. Yang, "An Automatic Self-Checking and Healing Physically Uncloneable Function (PUF) with  $< 3E-8$  Bit Error Rate", IEEE International Solid-State Circuits Conference (ISSCC), 2021. (Accepted)

2. Q. Zhou\*, **Y. He\*** K. Yang and T. Chi "Exploring PUF-Controlled PA Spectral Regrowth for Physical-Layer Identification of IoT Nodes," IEEE International Solid- State Circuits Conference (ISSCC), 2021. (Equally Creditted Author, Accepted)
3. **Y. He** and K. Yang, "A 65nm Edge-Chasing Quantizer-Based Digital LDO Featuring 4.58ps-FoM and Side-Channel-Attack Resistance," IEEE International Solid- State Circuits Conference (ISSCC) pp. 384-386, 2020.
4. Z. Yu, J. C. Chen, B. W. Avant, **Y. He**, et al "An 8.2mm<sup>3</sup> Implantable Neurostimulator with Magnetoelectric Power and Data Transfer," IEEE International Solid- State Circuits Conference (ISSCC) pp. 510-512, 2020.
5. B. Zheng, L. Jie, J. Bell, **Y. He** and M. P. Flynn, "A Two-Beam Eight-Element Direct Digital Beamforming RF Modulator in 40-nm CMOS," IEEE Transactions on Microwave Theory and Techniques, vol. 67, no. 7, pp. 2569-2579, Jul. 2019.
6. B. Zheng J. Bell **Y. He** L. Jie and M. P. Flynn " A 0.19 mm<sup>2</sup> 128 mW 0.8-1.2 GHz 2-beam 8-element digital direct to RF beamforming transmitter in 40 nm CMOS " IEEE Radio Frequency Integrated Circuits Symposium (RFIC) pp. 128-131 Jun. 2018.

## SKILLS AND TOOLS

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- **Skills:** Low Power VLSI Circuits Design and Measurement, Verilog RTL simulation, Synthesis, Placement & Routing
- **Software:** Virtuoso, VCS, Design Compiler, Innovus, Calibre, ADS, Hyperlynx, Hspice, Matlab
- **Testing Tools:** Oscilloscope, Spectrum Analyzer, Network Analyzer
- **Programming Language:** Python, C/C++, Labview, Perl

## SELECTED AWARDS

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- **Second-Class Scholarship for Outstanding Merits** *Nov. 2017*  
*Award for Top 5% Students Annually, Zhejiang University*
- **First-Class Scholarship for Outstanding Merits** *Nov. 2016*  
*Award for Top 1% Students Annually, Zhejiang University*
- **Second-Class Scholarship for Outstanding Merits** *Nov. 2015*  
*Award for Top 5% Students Annually, Zhejiang University*
- **Second Prize in Physics Competition** *Jul. 2015*  
*Award for Top 5% in the Physics Competition, Zhejiang University*