YUQING REN

Lab of **E**fficient **A**rchitectures for **D**igital-communication and **S**ignal-processing (LEADS)
National Mobile Communications Research Laboratory, Southeast University
No.2 Southeast University Road
Jiangning District, 211100, Nanjing, China

Mobile: +86 15895896213
Email: yqren@seu.edu.cn
Gender: Male
Citizenship: China, People's Republic of

RESEARCH INTERESTS

- **Wireless Communication and Signal Processing**
- **Hardware Design for Communication Systems**

EDUCATION EXPERIENCES

09/18 – **Pursing *M.E* degree in School of Information Science and Engineering, Southeast University, China**
Master of Electronics and Communication Engineering
Overall GPA: **90.0 / 100** Ranking: **24 / 126**
Major Course: Modern Digital Communication, Modern Digital Signal Processing
Advisor: Professor Xiaohu You, ***IEEE Fellow*** Co-Advisor: Professor Chuan Zhang

09/14 – 06/18 **School of Electronic and Optical Engineering, Nanjing University of Science and Technology, China**
Bachelor of Electronic and Information Engineering, June 2018
Overall GPA: **3.83 / 4.0** Ranking: **3 / 165**
BS Dissertation: Experimental Research of Polar Code Algorithms on Control Channel and Internet of Things Scenes
Major Courses: Digital Communication, Digital Signal Processing, Design of Digital Logic Circuit
Advisor: Professor Chuan Zhang Co-Advisor: Professor Feng Shu

RESEARCH EXPERIENCES

05/19 – Present **Efficient Decoding Algorithm for Channel Codes Based on 5G Standards** **Southeast University**
- Pursuing research in excellent error-correction performance of polar codes based on 5G standards, particularly in Belief Propagation (BP)-List and BP-Flip decoding.
- Developed the loop simplication method to optimize the selection of factor graphs for BP-List decoding.
- Proposed the generalized BP-Flip decoding and three flip set generation methods. With lower average decoding latency, the proposed BP-Flip decoder can achieve **SCL-8** performance.
- Related Publications: **[J1], [J3], [C1]**.

07/19 – Present **VLSI Designs for 5G Communication Systems** **Southeast University**
- Pursuing research in high throughput and low latency for polar decoders based on 5G.
- Designed the list routing network for permuted factor graphs, the proposed BP-List decoder based on 65nm CMOS technology could achieve the throughput of **5.07 Gbps** for length-1024 polar codes.
- Developed the flipping and sorting architectures for BP-Flip decoder, and the proposed BP-Flip decoder implemented by 40nm CMOS technology could achieve **4.19 Gbps** at **2.5 dB**.
- Related Publications: **[J2], [J4]**.

09/18 – 04/19 **Deep Learning Methods in Baseband Co-architecture Design** **Southeast University**
- Pursuing research in using AI technology to realize the baseband co-architecture design. Implemented the belief propagation decoding of polar codes based on deep neural networks to enhance the error-correction performance.

07/17 – 08/18 **Improved Blind Detection strategy of Polar Codes** **Southeast University**
- Proposed a blind detection of polar codes strategy could distinguish polar codes with different formats, which avoids the receiver's executing complicated decoding for all candidates, reducing the power, complexity, and delay.
- Related Publications: **[C2]**.

HONORS AND AWARDS

05/2019	**Excellent Postgraduate Student of Southeast University**	Award Rate: 1 / 10
11/2018	**Second Prize of Chinese postgraduate Mathematical Contest in Modeling**	Award Rate: top 20%
06/2018	**Excellent Bachelor Graduate, Nanjing University of Science and Technology**	Award Rate: 1 / 10
05/2018	**Excellent Bachelor Dissertation Award, Nanjing University of Science and Technology**	Award Rate: 1 / 50

03/2017	**Meritorious Winner of American Mathematical Contest in Modeling (MCN/ICM)**	Award Rate: top 15%
10/2015	**National Scholarship for Graduate Student, China MoE**	Award Rate: 1 / 70

PROFESSIONAL ACTIVITIES AND SKILLS

Reviewers	TSP, TWC, ISCAS 2020, GlobalSiP 2019, DSP 2018, SiPS 2018
Membership	IEEE Student Member
Skills	Python, Tensorflow, Verilog HDL, Implemented efficient polar decoders, Java

PATENT GRANT AND APPLICATIONS

11/2019	A Device for Polar Belief Propagation List Decoder	201911022459.2
11/2018	A Method of Efficient Blind Detection Decoding for Polar Codes	201811144879.1

PUBLICATIONS AND SUBMISSIONS

GOOGLE SCHOLAR LINK

[Publications]

IF 5.379 **[J1]** **Y. Ren**, Y. Shen, Z. Zhang, X. You, and C. Zhang, "Efficient Belief Propagation Polar Decoder With Loop Simplification Based Factor Graphs", ***IEEE Transactions on Vehicular Technology (TVT)*****, vol. 69, no. 5, pp. 5657-5660, May 2020.**

IF 2.814 **[J2]** Y. Shen, W. Song, **Y. Ren**, H. Ji, X. You, and C. Zhang, "Enhanced Belief Propagation Decoder for Polar Codes with Bit-Flipping", ***IEEE Transactions on Circuits and Systems II-Express Briefs (TCAS-II)*****, vol. 67, no. 5, pp. 901-905, May 2020 (accepted by *IEEE Int. Symp. on Circuits and Syst.* and invited to Special Issue on *IEEE ISCAS 2020*).**

IF 5.646 **[J3]** Y. Shen, W. Song, H. Ji, **Y. Ren,** C. Ji, X. You, and C. Zhang, "Improved Belief Propagation Polar Decoders with Bit-Flipping Algorithms", ***IEEE Transactions on Communications*****, Early Access, 2020.**

[C1] **Y. Ren**, W. Xu, X. You, and C. Zhang, "Efficient Belief Propagation List Decoding of Polar Codes", **in Proc. *IEEE Int. Conf. on ASIC (ASICON)*, Nov, China, 2019, pp. 1-4.**

[C2] **Y. Ren**, F. Shu, L. Li, Z. Zhang, X. You, and C. Zhang, "A Novel D-Metric for Blind Detection of Polar Codes", **in Proc. *IEEE Int. Workshop Sign. Process. (SiPS)*, Oct. South Africa, 2018, pp. 1-4.**

[Submissions]

[J4] **Y. Ren**, Y. Shen, H. Ji, C. Ji, Y. Huang, X. You, and C. Zhang, " Improved Belief Propagation List Decoder of 5G Polar Codes", ***IEEE Transactions on Circuits and Systems II-Express Briefs (TCAS-II)*****, under review, 2020.**