# AARON RUOWEN BAI

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## EDUCATION

**Ph.D., Electrical and Computer Engineering** 2018-2021
McMaster University, Canada
Dissertation: "Spectrum and Optical Power Efficient OFDM for Visible Light Communications"
Supervisor: Prof. Steve Hranilovic
Ph.D. Comprehensive Examination: P+
GPA: A+

**M.Eng. (with Hons.), Electronic Engineering** 2015-2018
Tsinghua University, China
Dissertation: "Research on Multi-carrier Key Techniques for Visible Light Communications"
Supervisor: Prof. Zhaocheng Wang

**B.Sc., Electronic Information Science and Technology** 2011-2015
Nankai University, China
Dissertation: "The Design of Microstrip Antenna"

## HONORS AND AWARDS

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|---|---|
| Ph.D. Comprehensive Examination: pass with distinction (P+) | 2020 |
| National Scholarship for Graduate Students (¥20000, rank 1/62) | 2017 |
| National Scholarship for Undergraduate Students (¥8000, rank 1/46) | 2014 |
| National First Prize in Contemporary Undergraduate Mathematical Contest in Modeling | 2014 |
| Tianjin Province-First Prize in National Undergraduate Electronic Design Contest | 2013 |
| Tianjin Province-First Prize in "TI Cup" Undergraduate Electronic Design Contest | 2012 |

## TECHNICAL SKILLS

- MATLAB: 9-year Programming Experience in Monte-Carlo Simulations, Algorithm Design and Implementation, Proficient in Simulink, and Tool Boxes Related to Communications and DSP
- Python: 5-year Programming Experience in Quantization, Data Visualization, Machine Learning Framework, TensorFlow and PyTorch
- Proficient in Embedded C/C++, SQL, Java, JavaScript, Jupyter, Verilog and VHDL (for FPGA)
- Experienced with Common Linux/Ubuntu Commands, Git/Github, Android Studio, Google Colab
- Proficient in using Oscilloscope, Spectrum Analyzer, JTAG, Logic Analyzer, System Analyzer
- Proficient in Using Operating Systems Such as Windows, Linux/Ubuntu and macOS
- Proficient in Microsoft Office Tools such as Word, Excel and PPT
- Good Team Player and Leader with Strong Communication Skills
- Strong Written English and Mandarin

# PROFESSIONAL EXPERIENCE

**The University of British Columbia**
Postdoctoral Research Fellow 05.2022 – Present
Supervisor: Prof. Julian Cheng

I. Help Create Secure Mobile Networks Using Ultraviolet Communication Technology
   a. Research on Monte-Carlo Simulation Models for Multiple Scattering UVC Channels
   b. The UVC Capacity Derivation and Proof
   c. System Simulation and Proof Based on USRP, Matlab & Simulink
   d. Ultraviolet Communication System Design Based on FPGA and ARM

II. Marine Mammal Detection and Classification
   a. Research on Machine Learning Neural Networks Using Marine Mammal Sounds/Pictures
   b. Construct Neural Network Models Based on PyTorch and Tensorflow AI Framework
   c. Achieve Above 95% Classification Accuracy for 32 Different kinds of Mammals

**McMaster University**
Postdoctoral Research Fellow 01.2022 – 04.2022
Supervisor: Prof. Steve Hranilovic

I. Proposed a novel low-complexity modulation scheme saving 50% arithmetic operations, and thus led a journal paper published in TGCN
II. Finished a Paper Draft on Optimal Power Allocation for SO-OFDM
III. Research in Secure Optical OFDM for Li-Fi

Teaching Assistant for 7 distinct courses 09.2018 – 12.2021
My Responsibilities: Leading tutorials, lab supervision, lab report marking, project report marking, grading midterm test and final exam, interacting with students, etc.

**Tsinghua University**
Teaching Assistant for "Foundations of Electronic Circuits and Systems" 02.2016 – 01.2017
My Responsibilities: Lab supervision, report marking, interacting with students, etc.

Research Assistant for Li-Fi Techniques 02.2016 – 06.2018
Research in MIMO, OFDM, Optical Wireless Communications for Li-Fi.

**Nankai University**
Librarian Assistant 02.2013 – 01.2014
My Responsibilities: Classify new books and sort the books onto shelves.
Awarded Title: Excellent Individual for the Work-Study Program.

# Volunteer SERVICE

**Topic Editor** for Frontiers in Communications and Networks Since 2022
IEEE Member / Optica(formerly OSA) Member
Volunteer Tutor for 7 Undergraduates at McMaster University: 2021-2022
a. Research on LED Deployment under Illumination Constraints
b. Simulate an Office Illumination Distribution Using Zemax OpticStudio

Active Journal and Conference Reviewer:
IEEE Transactions on Communications, IEEE Journal of Lightwave Technology, Optics Express, IEEE Communication Letters, IEEE Access, GLOBECOM, ICC, etc.

**Vice President** of Duolong Electronic Association at Nankai University 2013-2014

# SELECTED PUBLICATIONS

**Google Scholar Citations: 149**

## Journal Articles

**R. Bai** and S. Hranilovic, "Low-Complexity Layered ACO-OFDM for Power-Efficient Visible Light Communications," *IEEE Transactions on Green Communications and Networking*, vol. 6, no. 3, pp. 1780-1792, Sept. 2022, doi: 10.1109/TGCN.2022.3147970.

**R. Bai** and S. Hranilovic, "Kramers-Kronig Optical OFDM for Bandlimited Intensity Modulated Visible Light Communications," *IEEE/OSA Journal of Lightwave Technology*, vol. 39, no. 22, pp. 7135-7145, Nov. 2021, doi: 10.1109/JLT.2021.3110661.

**R. Bai** and S. Hranilovic, "Layered Antisymmetry-Constructed Clipped Optical OFDM for Low-Complexity VLC Systems." Optics Express, vol. 29, no. 7, pp. 10613-10630, Mar. 2021.

**R. Bai** and S. Hranilovic, "Absolute Value Layered ACO-OFDM for Intensity-Modulated Optical Wireless Channels," *IEEE Transactions on Communications*, vol. 68, no. 11, pp. 7098-7110, Nov. 2020, doi: 10.1109/TCOMM.2020.3010986.

**R. Bai**, Z. Wang, R. Jiang and J. Cheng, "Interleaved DFT-Spread Layered/Enhanced ACO-OFDM for Intensity-Modulated Direct-Detection Systems," *IEEE/OSA Journal of Lightwave Technology*, vol. 36, no. 20, pp. 4713-4722, Oct., 2018, doi: 10.1109/JLT.2018.2864275.

**R. Bai**, Q. Wang and Z. Wang, "Asymmetrically Clipped Absolute Value Optical OFDM for Intensity-Modulated Direct-Detection Systems," *IEEE/OSA Journal of Lightwave Technology*, vol. 35, no. 17, pp. 3680-3691, Sept. 2017, doi: 10.1109/JLT.2017.2716983.

**R. Bai**, J. Chen, T. Mao and Z. Wang, "Enhanced Asymmetrically Clipped DC Biased Optical OFDM for Intensity-Modulated Direct-Detection Systems," *Journal of Communications and Information Networks*, vol. 2, no. 4, pp. 36-46, Dec. 2017, doi: 10.1007/s41650-017-0035-5.

T. Mao, R. Jiang, and **R. Bai**, "Optical Dual-Mode Index Modulation Aided OFDM for Visible Light Communications", *Optics Communications*, vol. 391, pp.37-41, May 2017.

**R. Bai**, R. Jiang, T. Mao, W. Lei, and Z. Wang, "Iterative Receiver for ADO-OFDM with Near-Optimal Optical Power Allocation," *Optics Communications*, vol. 387, pp. 350–356, Mar. 2017.

## Conference Articles & Presentations

**R. Bai** and S. Hranilovic, "Layered Antisymmetry-constructed Clipped Optical OFDM for IM/DD Systems," in *Proc. IEEE Global Communications Conference (GLOBECOM 2019)*, Waikoloa, HI, USA, 2019, pp. 1-6. (Presenter: Dr. S. Hranilovic)

**R. Bai** and S. Hranilovic, "Absolute Value Layered ACO-OFDM for Intensity-modulated Optical Wireless Channels", in *Proc. IEEE International Conference on Communications (ICC 2019)*, Shanghai, China, 2019, pp. 1-6. (Presenter: R. Bai)

**R. Bai**, R. Jang, J. Tan and J. Quan, "Performance Comparison of VLC MIMO Techniques Considering Indoor Illuminance with Inclined LEDs," in *Proc. IEEE International Conference on Wireless for Space and Extreme Environments (WiSEE)*, Aachen, Germany, 2016, pp. 105-110. (Presenter: R. Bai)