

## **Zhiliang QIN**

Deputy Chief Engineer

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**Research Interests:** Machine learning and deep learning for signal processing and computer visions, channel coding, wireless communications, data storage systems

## **PARTICULARS**

Citizenship : Singaporean

Year of Birth : 1974

Gender: Male

Marital Status: Married

## **Titles Accorded**

High-Level Talent Certified by the Shandong Province (山东省组织部认证省高层次人才)

Distinguished Technical Expert of Industrial Engineering, Weihai, Shandong (山东省威海市产业工程特聘专家)

Distinguished Talent of Weihai City (山东省威海市英才)

## **Technical Committee Member (TPC)**

2020 12<sup>th</sup> International Conference on Signal Processing Systems (ICSPPS 2020)

2020 3<sup>rd</sup> International Conference on Machine Learning and Machine Intelligence (MLMI 2020)

2020 5<sup>th</sup> International Conference on Multimedia Systems and Signal Processing (ICMSSP 2020)

2021 International Conference on Computer, Control, and Robotics (ICCCR 2021)

2021 6<sup>th</sup> International Conference on Multimedia Systems and Signal Processing (ICMSSP 2021)

2020 International Conference on Cyberspace Innovation of Advanced Technologies (CIAT 2020)

2020 3<sup>rd</sup> International Conference on Control and Robots (ICCR 2020)

## **WORK EXPERIENCE**

2019. 3 ~ Present

Deputy Chief Engineer, Weihai Beiyang Electric Group Co. Ltd.

Director of Opto-Electronics Research Center

Director of IOT Research Center

Director of Data Intelligence (AI) Research Center

Director of Postdoctoral Research Station

Scientific Advisor of the Weihai Cloud Computing Center

2002. 2 ~ 2019.3

Scientist

Algorithm Development (AI, Signal Processing, and Image Processing)

Agency for Science, Technology, and Research (A\*STAR), Singapore

## ACADEMIC QUALIFICATION

- **Ph.D. in Electrical Engineering** Feb. 1999-Feb. 2002  
Nanyang Technological University (NTU), Singapore
- **Master of Science in Electrical Engineering** Sept. 1995-Aug.1998  
Graduate School of China Academy of Engineering Physics, Beijing, China
- **Bachelor of Engineering in Electrical Engineering** Sept. 1991-Jul. 1995  
Beijing Institute of Technology, Beijing, China

## Academic Achievements

- Published about 70 SCI/EI papers in the area of deep learning, machine learning, signal processing, wireless communications, and optimization theories.
- Granted 3 US patents.

## PUBLICATION LIST

### Journal Papers:

1. Ruofei Ma, Ruisong Wang, Gongliang Liu, Hsiao-Hwa Chen, and **Zhiliang Qin**, "UAV-Assisted data collection for ocean monitoring networks," Accepted for publication at the *IEEE Network Magazine*.
2. **Zhiliang Qin**, Kui Cai, and Yibin Ng, "Iterative detection and decoding for nonbinary LDPC coded partial-response channels with written-in errors," *IET Communications*, vol. 10, pp. 399-406, Mar. 2016, U.K..
3. **Zhiliang Qin**, Kui Cai, and Kheong Sann Chan, "Iterative reduced-complexity graph-based detection for LDPC coded 2D recording channels," *IEEE Transactions on Magnetics*, vol. 49, pp. 2598-2602, June 2013.
4. **Zhiliang Qin** and Kah Chan Teh, "A low-complexity soft-input/soft-output multiuser detector based on local search algorithms," *IEEE Transactions on Wireless Communications*, vol. 7, pp.5257-5262, Dec. 2008.
5. **Zhiliang Qin** and Xiaoxin Zou, "Iterative reduced-search decoding for coded partial-response channels," *IEEE Transactions on Communications*, vol. 56, pp. 1575-1580, Oct. 2008.
6. **Zhiliang Qin** and Kah Chan Teh, "Reduced-complexity turbo equalization for coded intersymbol interference channels based on local search algorithms," *IEEE Transactions on Vehicular Technology*, vol. 57, pp. 630-635, Jan. 2008.
7. **Zhiliang Qin**, Kui Cai, and Xiaoxin Zou, "A reduced-complexity iterative receiver based on simulated annealing for coded partial-response channels," *IEEE Transactions on Magnetics*, vol. 43, pp. 2265-2267, Jun. 2007.

8. **Zhiliang Qin** and Kah Chan Teh, "Iterative reduced-complexity multiuser detection based on Chase decoding for synchronous turbo-coded CDMA system," *IEEE Journal of Selected Areas in Communications (Special Issue on Next-Generation CDMA Technologies)*, vol. 24, pp. 200-208, Jan. 2006.
9. **Zhiliang Qin** and Kah Chan Teh, "Iterative reduced-state decoding for coded partial-response channels," *IEEE Transactions on Magnetics*, vol. 41, pp. 4335-4337, Nov. 2005.
10. **Zhiliang Qin**, Kah Chan Teh and Erry Gunawan, "Iterative reduced-state multiuser detection for asynchronous coded CDMA," *IEEE Transactions on Communications*, vol. 50, pp. 1892-1894, Dec. 2002.
11. **Zhiliang Qin**, Kah Chan Teh and Erry Gunawan, "Iterative multiuser detection for asynchronous CDMA with concatenated convolutional coding," *IEEE Journal of Selected Areas in Communications (Special Issue on the Turbo Principle)*, vol. 19, pp. 1784-1792, Sept. 2001.
12. **Zhiliang Qin**, and Kah Chan Teh, "Iterative multiuser detection for serially concatenated convolutionally coded asynchronous CDMA," *IEE Electronics Letters*, Vol. 36, No. 10, pp. 898-899, May 11, 2000.
13. **Zhiliang Qin**, Kah Chan Teh, and Erry Gunawan, "Iterative interference cancellation for asynchronous CDMA with reduced-state turbo decoders," *IEE Electronics Letters*, Vol. 36, No. 19, pp. 1652-1653, Sept. 14, 2000.
14. **Zhiliang Qin**, and Kah Chan Teh, "Iterative multiuser detection with Gauss-Seidel soft detector as first stage for asynchronous coded CDMA," *IEE Electronics Letters*, Vol. 36, No. 23, pp. 1939-1940, Nov. 9, 2000.
15. Y. Ng, S. Zhang, K. Cai, **Z. Qin**, C.L. Ong, S. Ang, and Z. Yuan, "Performance of perpendicular magnetic recording with track squeeze using bidirectional pattern-dependent noise prediction detector", *Journal of Applied Physics*, Mar. 2015.
16. Kui Cai, **Zhiliang Qin**, and Bingjin Chen, "Channel capacity and soft-decision decoding of LDPC codes for spin-torque transfer magnetic random access memory (STT-MRAM)," *Journal of Communications*, vol. 8, No. 4, April 2013.
17. Yi Bin Ng, Kui Cai, B. V. K. Vijaya Kumar, **Zhiliang Qin**, Tow Chong Chong, "Bidirectional pattern-dependent noise prediction with LDPC codes for HAMR", *IEEE Transactions on Magnetics*, vol. 49, No. 6, pp. 2661-2664, Jun. 2013.
18. Songhua Zhang, Kui Cai, and **Zhiliang Qin**, "A position dependent binary symmetric channel model for BPMR write errors", *IEEE Transactions on Magnetics*, vol. 49, No. 6, pp. 2582-2585, Jun. 2013.
19. M. Chua, M. R. Elidrissi, K. Eason, S. H. Zhang, and **Zhiliang Qin**, et al, "Comparing analytical micromagnetic and statistical channel models at 4 Tcbpsi patterned media recording", *IEEE Transactions on Magnetics*, vol. 48, pp. 1826-1832, 2012.
20. M. Shaghghi, Kui Cai, Yong Liang Guan, and **Zhiliang Qin**, "Markov Chain Monte Carlo based detection for two-dimensional intersymbol interference channels," *IEEE Transactions on Magnetics*, vol. 57, pp. 471-478, Jan. 2011.

21. Songhua Zhang, Kui Cai, Maria Yu-Lin, Jinliang Zhang, **Zhiliang Qin**, Kim Keng Teo, Wai Ee Wong, and Eng Teo Ong, "Timing and written-in errors characterization for bit-patterned media," *IEEE Transactions on Magnetics*, vol. 47, pp. 2555-2558, Oct. 2011.
22. M. R. Elidrissi, Kheong Sann Chan, Kim Keng Teo, K. Eason, Euseok Hwang, **Zhiliang Qin**, "Modeling of 2-D magnetic recoding and a comparison of data detection schemes", *IEEE Transactions on Magnetics*, vol. 47, pp. 3685-3690, 2011.
23. Songhua Zhang, Kao-Siang Chai, Kui Cai, Bingjin Chen, **Zhiliang Qin**, and Siang-Meng Foo "Write failure analysis for bit-patterned-media recording and its impact on read channel modeling," *IEEE Transactions on Magnetics*, vol. 46, pp. 1363-1365, June 2010.
24. Kui Cai, K. A. S. Immink, Y. X. Lee, **Zhiliang Qin**, and Tow Chong Chong, "Distance-Enhancing constrained codes with parity-check constraints for data storage channels," *IEEE Journal of Selected Areas in Communications*, vol. 28, pp. 208-217, Feb. 2010. (*Best Paper Award in IEEE Communication Society in Coding and Signal Processing for Data Storage, 2010*)
25. Xiaoxin Zou, **Zhiliang Qin**, and Kui Cai, "Read channel simulation based on microtrack and micromagnetic modeling for one terabit per square inch magnetic recording," *Journal of Magnetism and Magnetic Materials (JMMM)*, vol. 320, pp. 3128-3131, Nov. 2008.
26. Kui Cai, Kees A. Schouhamer Immink, **Zhiliang Qin**, Lu Ping Shi, and Xiang Shui Miao, "Error Correction Code Failure Rate Analysis for Parity-Check-Coded Optical Recording Systems," *Japanese Journal of Applied Physics*, vol. 47, 2008.
27. Kui Cai, J. W. M. Bergmans, **Zhiliang Qin**, A. Padily, and W. Coene, "Parity-Check codes and post-processing for  $d=1$  optical recording channels," *IEEE Transactions on Magnetics*, vol. 41, pp. 4338-4340, Nov. 2005.
28. Chuanzhen Hu, Kah Chan Teh, Yong Liang Guan and **Zhiliang Qin**, "Performance of iterative multiuser receivers for turbo coded asynchronous DS-CDMA systems over flat-fading channels," *IEEE Proceeding on Communications*, vol. 152, pp. 705-712, Oct. 2005.

### **Conference Papers**

1. Yuanyuan Qu, Nina Zhang, Yue Meng, **Zhiliang Qin\***, Qidong Lu and Xiaowei Liu, "ECG heartbeat classification based on WaveNet-LSTM," *Presented at the International Conference on Frontiers of Sensor Technologies (ICFST)*, Shanghai, China, Nov. 6-9, 2020.
2. Jianrui Lu, Ruofei Ma, Gongliang Liu, and **Zhiliang Qin\***, "Deep convolutional neural network with transfer learning for environmental sound classification, " *Accepted for Presentation at the International Conference on Computer, Control, and Robotics (ICCCR)*, Shanghai, China, Jan. 8-11, 2021.
3. Nina Zhang, **Zhiliang Qin\***, Yingying Li, Luyan Xing, Qidong Lu, Xiaowei Liu, "Quantized turbo equalization for non-binary LDPC coded partial-response channels," *Accepted for Presentation at the International Conference on Computer, Control, and Robotics (ICCCR)*, Shanghai, China, Jan. 8-11, 2021.

4. Xingming Li, **Zhiliang Qin\***, Yu Qin, Yuanhao Sun, Qidong Lu, Xiaowei Liu, "Limited-Search Chase Decoding Algorithm for LDPC Coded Underwater Acoustic Multiuser Channels," *Accepted for Presentation at the International Conference on Computer, Control, and Robotics (ICCCR)*, Shanghai, China, Jan. 8-11, 2021.
5. Xingming Li, Jigang Yu, **Zhiliang Qin\***, Yuanhao Sun, Qidong Lu and Xiaowei Liu, "Evolutionary Programming: A Population-Based Machine Learning Model for Coded MIMO Channels," *Presented at the Internal Conference on Signal Processing Systems (ICSPS)*, Shanghai, China, Nov.6-9, 2020.
6. Xixi Bi, Ruofei Ma, **Zhiliang Qin\***, and Gongliang Liu, "On relay selection for relay-assisted D2D communications with adaptive modulation and coding in cellular systems," *Presented at the 3<sup>rd</sup> EAI International Conference on 6G for Future Wireless Networks*, Tianjin, China, Aug 15-16 2020
7. Zhixiang Hu, **Zhiliang Qin**, Ruofei Ma, and Gongliang Liu, "A joint scheduling scheme for relay-involved D2D communications with imperfect CSI in cellular systems," *Presented at the 3<sup>rd</sup> EAI International Conference on 6G for Future Wireless Networks*, Tianjin, China, Aug 15-16 2020. (Best Paper Award)
8. Yuanyuan Qu, Zhongkai Zhang, **Zhiliang Qin\***, Jiali Yu, Qidong Lu, Xiaowei Liu, "Wavelet-Aided Stock Forecasting Model based on Ensembled Machine Learning," *Presented at the 3<sup>rd</sup> Intertional Conference on Machine Learning and Machine Intelligence (MLMI)*, Hangzhou, China, Sept. 18-20, 2020.
9. **Zhiliang Qin\***, Yu Qin, Yingying Li, Zhongkai Zhang, Xiaowei Liu, "Genetic Algorithm (GA)-Based Detection for Coded Partial- Response Channels," *Presented at the 3<sup>rd</sup> Intertional Conference on Machine Learning and Machine Intelligence (MLMI)*, Hangzhou, China, Sept. 18-20, 2020.
10. Jiali Yu, Yuanyuan Qu, Zhongkai Zhang, Qidong Lu, **Zhiliang Qin\*** and Xiaowei Liu, "Speech Recognition Based on Concatenated Acoustic Feature and LightGBM Model," *Presented at the Internal Conference on Signal Processing Systems (ICSPS)*, Shanghai, China, Nov.6-9, 2020.
11. **Zhiliang Qin\***, Yingying Li, Yu Qin, Qidong Lu and Xiaowei Liu, "Graph-Based Detection and Reduced-Complexity LDPC Decoding over 2D Intersymbol Interference Channels," *Presented at the Internal Conference on Signal Processing Systems (ICSPS)*, Shanghai, China, Nov.6-9, 2020.
12. Qidong Lu, Yu Qin, Yingying Li, **Zhiliang Qin\*** and Xiaowei Liu, "Machine Fault Diagnosis Based on Multi-head Deep Learning Network," *Presented at the Internal Conference on Signal Processing Systems (ICSPS)*, Shanghai, China, Nov.6-9, 2020.
13. Qidong Lu, Yingying Li, **Zhiliang Qin\***, Xiaowei Liu ,Yun Xie, "Speech Recognition using EfficientNet," *Presented at the 5rd International Conference on Multimedia System and Signal Processing (ICMSSP)*, Chengdu, China, May 28-30, 2020.
14. S. R. Ravichandran, B. Nataraj, S. Huang, **Zhiliang Qin**, "3D Inception U-Net for Aorta Segmentation using Computed Tomography Cardiac Angiography", *IEEE EMBS International Conference on Biomedical & Health Informatics (BHI)*, 2019.
15. **Zhiliang Qin**, Cen Cen, and Jie Wang, "Knowledge-Graph Based Multi-Target Deep-Learning Models for Train Anomaly Detection", *International Conference on Intelligent Rail Transportation (ICIRT)*, Singapore, 2018.

16. **Zhiliang Qin**, Anmin Kong, and Xueqiang Wang, “Nonbinary multi-parallel-concatenated single-parity-check (NB-MPCSPC) codes over partial-response channels,” *IEEE International Conference on Information, Communications, and Signal Processing (ICICS)*, Singapore, 2015.
17. **Zhiliang Qin**, Kui Cai, and Songhua Zhang, “Iterative symbol-level detection and decoding for nonbinary LDPC Coded 2D intersymbol interference channels,” *International Conference on Communications (ICC)*, London, U.K., June 2015.
18. **Zhiliang Qin**, Kui Cai, Yibin Ng, and Songhua Zhang, “Iterative joint detection and decoding for nonbinary LDPC coded partial-response channels with written-in errors,” *IEEE Magnetic Symposium*, Singapore, Sept, 2014.
19. Kui Cai, **Zhiliang Qin**, and Bingjin Chen, “Modeling and information theoretic analysis of spin-torque transfer magnetic random access memory (STT-MRAM)”, *IEEE Magnetic Symposium*, 2014.
20. Kui Cai, **Zhiliang Qin**, and Bingjin Chen, “Channel capacity and soft-decision decoding of LDPC codes for spin-torque transfer magnetic random access memory (STT-MRAM)”, *International Conference on Computing Networking and Communications (ICNC)*, 2013.
21. S. H. Zhang, K. Cai, and **Zhiliang Qin**, “A position dependent binary symmetric channel model for BPMR write errors,” *Aisa-Pacific Magnetic Recording Conference (APMRC)*, Singapore, Oct. 2012.
22. M. H. L. Lim, W. L. Goh, and **Zhiliang Qin**, “A novel FPGA implementation of mirror-paradigm RS-based QC-LDPC decoder for NVM channels”, *International Symposium on Intelligent Signal Processing and Communications*, 2012.
23. Yi Bin Ng, Kui Cai, B. V. K. Vijaya Kumar, **Zhiliang Qin**, Tow Chong Chong, “Bidirectional pattern-dependent noise prediction with LDPC codes for HAMR”, *Aisa-Pacific Magnetic Recording Conference (APMRC)*, Singapore, Oct. 2012.
24. S. S. Shafi’ee, M. R. Elidrissi, **Zhiliang Qin**, Kheong Sann Chan, Yong Liang Guan, “Application and optimization of factor graph based detector on 1D ISI magnetic recording channel”, *Asia-Pacific Magnetic Recording Conference*, 2012.
25. Kui Cai, **Zhiliang Qin**, Songhua Zhang, and Yibin Ng, “Modeling, detection, and LDPC codes for bit-patterned media recording,” *IEEE Globecom*, Miami, FL, US, 2010.
26. **Zhiliang Qin**, Kui Cai, and Songhua Zhang, “Reduced-complexity decoding of high-rate LDPC codes over partial-response channels,” *IEEE International Conference on Communication Systems (ICCS)*, Singapore, 2010.
27. **Zhiliang Qin**, Kui Cai, and Songhua Zhang, “Multiple parallel concatenation of low-density parity-check codes based on BIBD,” *IEEE International Conference on Communication Systems (ICCS)*, Singapore, 2010.
28. **Zhiliang Qin**, Kui Cai, and Songhua Zhang, “Reduced-Complexity iterative receiver for LDPC coded systems,” *APSIPA Annual Summit and Conference*, Singapore, 2010.
29. M. Shaghghi, Yong Liang Guan, Kui Cai, and **Zhiliang Qin**, “Combined normalized and offset minimum sum decoding over partial response channels,” *IEEE International Conference on Information, Communications, and Signal Processing (ICICS)*, Macau, 2009.

30. **Zhiliang Qin**, Siang Meng Foo, Kui Cai, and Songhua Zhang, "A low-complexity soft-input/soft-output channel detector for single-head/multi-track systems," *International Symposium on Optical Memory (ISOM)*, Nagasaki, Japan, Oct. 2009.
31. Kui Cai, Kees A. Schouhamer Immink, and **Zhiliang Qin**, "Distance-Enhancing Constrained Codes for Optical Recording Channels," *IEEE Globecom*, New Orleans, LO, US, 2008.
32. **Zhiliang Qin**, Xiaoxin Zou, and Kui Cai, "Turbo multiuser detection based on simulated annealing," in *Proc. 3<sup>rd</sup> IEEE Conference on Industrial Electronics and Applications (ICIEA)*, Singapore, Jun. 2008.
33. Xiaoxin Zou, **Zhiliang Qin**, and Kui Cai, "TPCSPC decoding over coded partial-response channels," in *Proc. 3<sup>rd</sup> IEEE Conference on Industrial Electronics and Applications (ICIEA)*, Singapore, June 2008.
34. **Zhiliang Qin**, Songhua Zhang, Kui Cai, Xiaoxin Zou, and Kheong Sann Chan, "An improved Chase decoder for turbo product codes over partial-response channels," in *Proc. International Symposium on Optical Memory and Optical Data Storage (ISOM/ODS)*, Hawaii, U.S., July, 2008.
35. Xiaoxin Zou, **Zhiliang Qin**, Kui Cai, and Songhua Zhang, "Sum-product-decoding of multiple-parallel-concatenated single-parity-check codes over partial-response channels," in *Proc. International Symposium on Optical Memory and Optical Data Storage (ISOM/ODS)*, Hawaii, U.S., July, 2008.
36. Songhua Zhang, **Zhiliang Qin**, Xiaoxin Zou, and Kui Cai, "Signal modeling for ultra-high density bit patterned media and performance evaluation," in *Proc. Intermag Conference*, Madrid, Spain, May 2008.
37. **Zhiliang Qin**, Xiaoxin Zou, and Kui Cai, "Iterative receiver based on local search algorithms for coded multiuser MIMO channels," in *Proc. 6<sup>th</sup> International Conference on Information, Communications, and Signal Processing (ICICS 2007)*, Singapore, Dec. 2007.
38. Xiaoxin Zou, **Zhiliang Qin**, and Kui Cai, "Improved turbo SICMMSE equalization for coded intersymbol interference channels," in *Proc. 6<sup>th</sup> International Conference on Information, Communications, and Signal Processing (ICICS 2007)*, Singapore, Dec. 2007.
39. **Zhiliang Qin**, Kui Cai, Xiangshui Miao, and Luping Shi, "A low-complexity turbo equalizer based on iterated Lin-Kernighan algorithm," in *Proc. International Symposium on Optical Memory (ISOM)*, Singapore, Oct. 2007.
40. **Zhiliang Qin**, Kui Cai, and Xiaoxin Zou, "Turbo multiuser detection based on local search algorithms," in *Proc. International Conference on Communications (ICC)*, Glasgow, U.K., June 2007.
41. **Zhiliang Qin**, Kui Cai, and Xiaoxin Zou, "A reduced-complexity iterative receiver based on simulated annealing for coded partial-response channels," in *Proc. 10<sup>th</sup> joint MMM-Intermag Conference*, Baltimore, USA, Jan. 2007.

42. **Zhiliang Qin**, “Decision-feedback turbo equalization for coded intersymbol interference channels,” in *Proc. 1<sup>st</sup> IEEE Conference on Industrial Electronics and Applications (ICIEA)*, Singapore, May 2006.
43. **Zhiliang Qin** and Lim Beng Wah, “Iterative detection for  $(0, k)$ -constrained magnetic recording channels,” in *Proc. 9<sup>th</sup> joint MMM-Intermag Conference*, Anaheim, US, 2004.
44. Kui Cai, G. Mathew, J. Bergmans, **Zhiliang Qin**, “A generalized Braat-Hopkins model for optical recording channels”, *IEEE Conference on Consumer Electronics*, 2003.
45. **Zhiliang Qin**, Kah Chan Teh and Erry Gunawan, “Reduced-state turbo multiuser detection for convolutionally coded asynchronous CDMA,” in *Proc. 2<sup>nd</sup> International Symposium on Turbo Codes and Related Topics*, France, Sept. 2000.
46. **Zhiliang Qin** and Kah Chan Teh, “Iterative demodulation and decoding of turbo coded DPSK,” in *Proc. 3<sup>rd</sup> International Conference on Information, Communication, and Signal Processing (ICICS)*, Singapore, Oct. 2001.
47. **Zhiliang Qin** and E. Gunawan, “Iterative multiuser detection for serially concatenated convolutionally coded CDMA with rate-1 inner code”, in *Proc. 3<sup>rd</sup> International Conference on Information, Communication, and Signal Processing(ICICS)*, Singapore, Oct. 2001.

#### **Granted US Patents:**

1. Cai Kui, **Zhiliang Qin**, and Xueqiang Wang, “Error correction method and modular for non-volatile memory,” US Patent No. 9454428, Date of Patent Issued: 27 Sept. 2016.
2. Cai Kui and **Zhiliang Qin**, “Memory device with soft-decision decoding,” US Patent No. 8917540, Date of Patent Issued: 23 Dec, 2014.
3. **Zhiliang Qin**, M.R. Elidrissi, and Kheong Sann Chan, “Data storage device including a recording channel, a detector, and a noise prediction circuit, and method of processing a signal in a data storage device,” US Patent No. 8786968, Date of Patent Issued: 22 July 2014.