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Academic Qualifications

- Shanghai Jiao Tong University, P.R. China, Information and Control Engineering, B. Eng in 1992
- The National University of Singapore (NUS), Singapore, Electrical Engineering, M. Eng in 2000
- Technical University of Eindhoven (TU/e) & The National University of Singapore (NUS), The Netherlands & Singapore, Electrical Engineering, Joint PhD in 2007

Working Experience

- April 2015 – Present, Associate Professor, Singapore University of Technology and Design (SUTD)
- January 2012 – December 2014, Adjunct Professor, Nanyang Technological University (NTU)
- July 1999 – March 2015, Leader of Coding and Signal Processing Group, Data Storage Institute (DSI), Agency for Science, Technology and Research (A*Star)

Awards and Honors

- 2021 Singapore 100 Women in Tech
- 2020 Who's Who in Engineering Singapore (3rd Edition)
- 2018 Exemplary Reviewer for IEEE Transaction on Communications
- 2018 Asia Pacific Magnetic Recording Conference (APMRC) Outstanding Student Paper Award (as corresponding author)
- 2008 IEEE Communications Society Best Paper Award in Coding and Signal Processing for Data Storage (as first & corresponding author)
- 2007 Data Storage Institute Best Paper Award (as first & corresponding author)
- 2011 Data Storage Institute Best Paper Award in Engineering (as first & corresponding author)
- 2010 President Technology Award, Singapore, Nomination (as team leader)
- 2011 President Technology Award, Singapore, Nomination (as team leader)

International Professional Activities

- **Membership**
 - 2011 – Present, IEEE Senior Member
- **IEEE Technical Committee Chair/Officer**
 - 2015 – 2016, Vice Chair-Academia, IEEE Communications Society, Data Storage Technical Committee (DSTC)
 - 2011 – 2014, Treasurer, IEEE Communications Society, Data Storage Technical Committee (DSTC)
- **IEEE DSTC Best Paper Award Selection Committee**
 - Selection Committee co-Chair for “2020-2021 Communications Society Best Paper Award in Coding and Signal Processing for Data Storage”
 - Selection Committee Chair for “2011-2012 Communications Society Best Paper Award in Coding and Signal Processing for Data Storage”
 - Selection Committee Chair for “2009 Communications Society Best Paper Award in Coding and Signal Processing for Data Storage”
- **Conference Chair/Organizing Committee Member**
 - Finance of The International Symposium on Information Theory and Its Applications (ISITA) 2018
 - Symposium Chair of IEEE Global Communications Conference (Globecom) 2017

- Invited Paper Chair of IEEE International Conference on Computing, Networking and Communications (ICNC) 2015
- Session Chair of IEEE International Conference on Computing, Networking and Communications (ICNC) 2013
- Session Chair of IEEE Intentional Communications Conference (ICC) 2012
- Session Chair of The Asia-Pacific Magnetic Recording Conference (APMRC) 2012,
- Session Chair of Non-Volatile Memory Workshop (NVMW), University of California San Diego, 2011
- Session Chair of IEEE Global Communications Conference (Globecom) 2010
- Technical Program Committee (TPC) Member of IEEE Intentional Communications Conference (ICC) 2013-2022
- Technical Program Committee (TPC) Member of IEEE Global Communications Conference (Globecom) 2012-2022

Keynote Speech

- **K. Cai**, "Information coding and error correction for DNA-based big data storage," **Keynote Speech**, *International Symposium on Big Data and Applied Statistic (ISBDAS)*, Dalian, China, Sept. 2019.

Invited Papers and Talks

- **K. Cai** and W. Song, "Analog error correcting codes for energy efficient computing", **invited talk**, International Symposium on Topics in Coding (ISTC) 2022, Montreal, Canada, Aug. 2022.
- X. Liu, **K. Cai**, and Z. Mei, "FPGA implementation of a hybrid decoder for STT-MRAM," **invited paper**, *IEEE Asia Pacific Conference on Circuits and Systems (APCCAS)*, Chengdu, China, Oct. 2018.
- **K. Cai**, "Channel modeling and error correction coding for electrical-field assisted MRAM," **invited paper**, *8th Magnetic Symposium*, Oct. 2017, Singapore.
- **K. Cai**, "Vertical constrained coding for phase-change memory with thermal crosstalk", **invited paper**, *IEEE International Conference on Computing, Networking and Communications*, (ICNC), Hawaii, USA, Feb. 2014
- **K. Cai**, Z. Qin, and B. Chen, "Modeling and information theoretic analysis of spin-torque transfer magnetic random access memory (STT-MRAM)", **invited paper**, *5th Magnetism Symposium*, Singapore, Oct., 2014.
- **K. Cai**, Z. Qin, and B. Chen, "Channel modeling and soft-decision decoding of LDPC codes for spin-torque transfer magnetic random access memory (STT-MRAM)", **invited paper**, *IEEE International Conference on Computing, Networking and Communications*, (ICNC), San Diego, USA, Jan. 2013.
- **K. Cai**, Z. Qin, S. Zhang, Y. Ng, K.S Chai, and R. Radhakrishnan, "Modeling, detection, and LDPC codes for bit-patterned media recording," **invited paper**, *IEEE Global Communications Conference (Globecom)*, Miami, USA, Dec. 2010.
- "Information theoretical analysis and polar coding for the cascaded BAC-GMC channel," *Japanese and Singapore Workshop on Coding and Information Theory*, **invited talk**, March 2018, Singapore.
- "Physics-based modeling and error correction for STT-MRAM," *Emerging Technologies & Applications in Spintronics Workshop*, **invited talk**, Singapore, Oct. 2017.

Books/Book Chapters

1. **K. Cai**, "Design and Analysis of Parity-Check-Code-Based Optical Recording Systems," ISBN 978-90-386-2003-9, 2007, University Printing Office, Technical University of Eindhoven, The Netherlands.
2. G. Song, H. Chi, **K. Cai**, Y. Li, and J. Cheng, "5G Networks: Requirements, Enabling Technologies, and Operations Management", Chapter 5, ISBN: 978-1-119-33273-2, Oct 2018, Wiley-IEEE Press.

Selected Journal Papers

1. C. Sun, K. Cai, G. Song, T. Quek, and Z. Fei, "Belief propagation based joint detection and decoding for resistive random access memories," *IEEE Trans. Commun.*, vol. 70, no. 4, pp. 2227 – 2239, April 2022.
2. K. Cai, K.M. Kiah, T.T. Nguyen, and E. Yaakobi, "Coding for sequence reconstruction for single edits," *IEEE Trans. Info. Theory*, vol. 68, no. 1, pp. 66 – 79, Jan. 2022.
3. X. He, K. Cai, and L. Zhou, "A class of optimal structures for node computations in message passing algorithms," *IEEE Trans. Info. Theory*, vol. 68, no. 1, pp. 93 – 104, Jan. 2022.
4. G. Song, K. Cai, C. Sun, X. Zhong, and J. Cheng, "Near-optimal detection for both data and sneak-path interference in resistive memories with random cell selector failures," *IEEE Trans. Commun.*, vol. 70, no. 2, pp. 836-850, Feb. 2022.
5. P. Kang, K. Cai, X. He, S. Li, and J. Yuan, "Generalized mutual information-maximizing quantized decoding of LDPC codes with layered scheduling" Early Access, *IEEE Trans. Vehicular Technology*, March 2022.
6. P. Kang, K. Cai, X. He, and J. Yuan, "Memory efficient mutual information-maximizing quantized min-sum decoding for rate-compatible LDPC codes," *IEEE Commun. Lett.* vol. 26, no. 4, pp. 733-737, April 2022.
7. X. Zhong, K. Cai, G. Song, W. Wang, and Y. Zhu, "Constrained coding and deep learning aided threshold detection for resistive memories," *IEEE Commun. Lett.* vol. 26, no. 4, pp. 803-807, April 2022.
8. X. Zhong, K. Cai, G. Song "Union bound analysis for spin-torque transfer magnetic random access memory (STT-MRAM) with channel quantization," *IEEE Trans. Magnetics*, vol. 58, no. 2, pp. 1-5, Feb. 2022.
9. L. Shi, K. Cai, W. Song, Z. Wang, and J. Li, "Asymmetric decentralized caching with coded prefetching under non-uniform requests," Early Access, *IEEE Systems Journal*, vol. 16, no. 1, pp. 197-208, March 2022.
10. T.T. Nguyen, K. Cai, and Kees Immink, "Efficient design of subblock energy-constrained codes and sliding window-constrained codes," *IEEE Trans. Info. Theory*, vol. 67, no. 12, pp. 7914 – 7924, Dec. 2021.
11. K. Cai, Y. M. Chee, R. Gabrys, H.M. Kiah, and T.T. Nguyen "Correcting a single indel/edit for DNA-based data storage: linear-time encoders and order-optimality," *IEEE Trans. Info. Theory, Special Issue Dedicated to the Memory of Vladimir I. Levenshtein*, vol. 67, no. 6, pp. 3438-3451, June 2021.
12. X. He, K. Cai, W. Song, and Z. Mei, "Dynamic programming for sequential deterministic quantization of discrete memoryless channels," *IEEE Trans. Commun.*, vol. 69, no. 6, pp. 3638-3651, June 2021.
13. T.T. Nguyen, K. Cai, Kees Immink, and H.M. Kiah, and "Capacity-approaching constrained codes with error correction for DNA-based data storage," *IEEE Trans. Info. Theory*, vol. 67, no. 8, pp. 1557-9654, Aug. 2021.
14. G. Song, K. Cai, X. Zhong, Y. Jiang, and J. Cheng, "Performance limit and coding schemes for resistive random-access memory channels," *IEEE Trans. Commun.*, vol. 69, no. 4, pp. 2093-2106, Apr. 2021.
15. Kees Immink and K. Cai, "Efficient encoding of constrained block codes," *IEEE Commun. Lett.* vol. 25, no. 11, pp. 3468 – 3472, Nov. 2021.
16. P. Li, G. Song, K. Cai, Q. Yu, "Across-array coding for resistive memories with sneak-path interference and lognormal distributed resistance variations," *IEEE Commun. Lett.* vol. 25, no. 11, pp. 3458 – 3462, Nov. 2021.
17. C. D. Nguyen, V.K. Vu, and K. Cai, "Two-dimensional weight-constrained codes for crossbar resistive memory arrays," *IEEE Commun. Lett.* vol. 25, no. 5, pp. 1435-1438, May 2021.
18. L. Shi, K. Cai, T. Yang, T. Wang, and J. Li, "Linear network coded wireless caching in cloud radio access network," *IEEE Trans. Commun.*, vol. 69, no. 2, pp. 701-715, Feb. 2021.
19. Kees Immink and K. Cai, "Spectral shaping codes," *IEEE Trans. Consumer Electronics*, vol. 67, no. 2, pp. 158-165, May 2021.
20. X. Zhong, K. Cai, Z. Mei, and T. Q. S. Quek, "Deep learning-based decoding of linear block codes for spin-torque transfer magnetic random access memory (STT-MRAM)," *IEEE Trans. Magnetics*, vol. 57, no. 2, pp. 1-5, Feb. 2021.
21. K.A.S Immink and K. Cai, "Block codes for energy-harvesting sliding-window constrained channels," *IEEE Commun. Lett.*, vol. 24, no. 11, pp. 2283-2286, Nov. 2020.
22. X. He and K. Cai, "Disjoint-set data structure-aided structured Gaussian elimination for solving sparse linear systems," *IEEE Commun. Lett.*, vol. 24, no. 11, pp. 2445-2449, Nov. 2020.
23. W. Song, K. Cai, K.A.S Immink, "Sequence-subset distance and coding for error control in DNA-based data storage," accepted by *IEEE Trans. Info. Theory*, June 2020.
24. Z. Mei, K. Cai, and X. He, "Deep learning-aided dynamic read thresholds design for multi-level-cell flash memories," *IEEE Trans. Commun.* vol. 68, no. 5, pp. 2850 – 2862, May 2020.
25. G. Song, K. Cai, Y. Chi, J. Guo, and J. Cheng, "Super-sparse on-off division multiple access: replacing repetition with idling," *IEEE Trans. Commun.* vol. 68, no. 4, pp. 2251 – 2263, April 2020.

26. J. Webber, R. Bu, K. Cai, and K.A.S. Immink, "Binary block codes for noisy channels with unknown offset," *IEEE Trans. Commun.*, Early Access.
27. K.A.S. Immink and K. Cai, "Properties and constructions of energy-harvesting sliding-window constrained codes," *IEEE Commun. Lett.*, Early Access.
28. Y. Qian, L.Q. Shi, L. Shi, K. Cai, J. Li, and F. Shi, "Cache-enabled power line communication networks: caching node selection and backhaul energy optimization," *IEEE Trans. Green Communications and Networking.*, vol. 4, no. 2, pp. 606 – 615, June 2020.
29. C. D. Nguyen, K. Cai, B. Wang, and Y. Hong, "On efficient concatenation of LDPC codes with constrained codes," *IEEE Trans. Magnetics*, vol. 56, no. 3, # 6701705, March 2020.
30. T. Wang, L. Shi, K. Cai, L. Tian, and S. Zhang, "Non-coherent NOMA with massive MIMO" *IEEE Wireless Commun. Lett.*, vol. 9, no. 2, pp. 134 – 138, Feb. 2020.
31. Z. Mei, K. Cai, L. Shi, and X. He, "On channel quantization for spin-torque transfer magnetic random access memory," *IEEE Trans. Commun.* vol. 67, no. 1, pp. 7526 – 7539, Nov. 2019.
32. K.A.S Immink and K. Cai, "Efficient balanced and maximum homopolymer-run restricted block codes for DNA-based data storage," *IEEE Commun. Lett.*, vol. 23, no. 10, pp. 1676-1679, Oct. 2019.
33. Z. Mei, K. Cai, and G. Song, "Performance analysis of finite-length LDPC codes over asymmetric memoryless channels," *IEEE Trans. Veh. Technol.*, vol. 68, no. 11, pp. 11338 – 11342, Nov. 2019.
34. P. Wu, J. Li, L. Shi, M. Ding, and K. Cai, "Dynamic content update for wireless edge caching via deep reinforcement learning," *IEEE Commun. Lett.*, vol. 23, no. 10, pp. 1773 – 1777, Oct. 2019.
35. X. He, K. Cai, and Z. Mei, "On finite alphabet iterative decoding of LDPC codes with high-order modulation," *IEEE Commun. Lett.*, vol. 23, no. 11, pp. 1913 – 1917, Nov. 2019.
36. K.A.S Immink and K. Cai, "Efficient balanced and maximum homopolymer-run restricted block codes for DNA-based data storage," *IEEE Commun. Lett.*, vol. 23, no. 10, pp. 1676-1679, Oct. 2019.
37. G. Song, K. Cai, H. Chi, and J. Cheng, "Union bound analysis and code design for multilevel flash memory channels," *IEEE Trans. Commun.*, vol. 67, no. 9, pp. 5963-5980, Sept. 2019.
38. K.A.S Immink and K. Cai, "Computation of the spectrum of dc²-balanced codes," *IEEE Trans. Commun.*, vol. 67, no. 7, pp. 4634 – 4640, Jul. 2019.
39. Y. Qian, F. Wang, J. Li, L. Shi, K. Cai, and F. Shu, "User association and path planning for UAV-aided mobile edge computing with energy restriction," *IEEE Wireless Commun. Lett.*, vol. 8, no. 5, pp. 2162-2337, Oct. 2019.
40. Z. Xie, P. Chen, Z. Mei, L. Shi, K. Cai, and Y. Fang, "Polar-coded physical layer network coding over two-way relay channels," *IEEE Commun. Lett.*, vol. 23, no. 8, pp. 1301 – 1305, Aug. 2019.
41. K.A.S Immink and K. Cai, "Estimated spectra of higher-order spectral null codes," *IEEE Commun. Lett.*, vol. 23, no. 01, pp. 20 – 23, Jan. 2019.
42. P. Chen, L. Shi, S.C. Liew, Y. Fang, and K. Cai, "Channel decoding for nonbinary physical-layer network coding in two-way relay systems," *IEEE Trans. Veh. Technol.*, vol. 68, no. 1, pp. 628 – 640, Jan. 2019.
43. G. Song, K. Cai, H. Chi, and J. Cheng, "Throughput analysis of interference cancellation-based random access with feedback," *IEEE Commun. Lett.*, vol. 22, no. 12, pp. 2423 – 2426, Dec. 2018.
44. W. Song, K. Cai, M. Zhang, and C. Yuen, "Codes with run-length and GC-content constraints for DNA-based data storage," *IEEE Commun. Lett.*, vol. 22, no. 10, pp. 2004 – 2007, Oct. 2018.
45. Z. Mei, K. Cai, and B. Dai, "Polar codes for spin-torque transform magnetic random access memory," *IEEE Trans. Magn.*, vol. 54, no. 11, # 3401305, Nov. 2018.
46. M. Zhang, K. Cai, Q. Huang, and S. Yuan, "On bit-level decoding of non-binary LDPC codes," *IEEE Trans. Commun.*, vol. 66, no. 9, pp. 3736 – 3748, Sept. 2018.
47. K.A.S Immink, K. Cai, and Jos H. Weber, "Dynamic threshold detection based on Pearson distance detection", *IEEE Trans. Commun.*, vol. 66, no. 7, pp. 2958 – 2965, July 2018.
48. P. Chen and K. Cai, "Rate-adaptive protograph LDPC codes for multi-level-cell (MLC) NAND flash memory", *IEEE Commun. Lett.*, vol. 22, no. 6, pp. 1112 – 1115, June 2018.
49. L. Shi, T. Yang, K. Cai, and P. Chen, "On MIMO linear physical-layer network coding: full-rate full-diversity design and optimization" *IEEE Trans. Wireless Commun.*, vol. 17, no. 5, pp. 3498 – 3511, May 2018.
50. W. Song, Kai Cai, C. Yuan, K. Cai, and G. Han, "On sequential locally repairable codes," *IEEE Trans. Info. Theory*, vol. 64, no. 5, pp. 3513 – 3527, May 2018.
51. K.A.S Immink and K. Cai, "Design of capacity-approaching constrained codes for DNA-based storage systems," *IEEE Commun. Lett.*, vol. 22, no. 2, pp. 224 – 227, Feb. 2018.

52. K.A.S Immink and K. Cai, "Composition Check Codes," *IEEE Trans. Info. Theory*, vol. 64, no. 1, pp. 249 – 256, Jan. 2018.
53. K. Cai, K.A.S Immink, M. Zhang, and R. Zhao. "On the Design of Spectrum Shaping Codes for High-Density Data Storage", *IEEE Trans. Consumer Electronics*, vol. 63, no. 4, pp. 477 – 482, Nov. 2017.
54. K. Cai and K.A.S Immink, "Cascaded Channel Model, Analysis, and Hybrid Decoding for Spin-Torque Transfer Magnetic Random Access Memory (STT-MRAM)," *IEEE Trans. Magn.*, vol. 53, no. 11, # 8204311, Nov. 2017.
55. P. Chen, K. Cai, and M. Zhang, "Non-Binary Protograph-Based LDPC Codes for 2D ISI Magnetic Recording Channels," *IEEE Trans. Magn.*, vol. 53, no. 11, # 8108905, Nov. 2017.
56. L. Kong, K. Cai, P. Chen, and F. Bing, "Detector-aware LDPC code optimization for ultra-high density magnetic recording channels", *IEEE Trans. Magn.*, vol. 53, no. 11, # 2500504, Nov. 2017.
57. C. A. Aslam, Y. L. Guan, and K. Cai, "Edge-based dynamic scheduling for belief-propagation (BP) decoding of LDPC and RS codes," *IEEE Trans. Commun.*, vol. 65, no. 2, pp. 525 – 535, Feb. 2017.
58. C. A. Aslam, K. Cai, and Y. L. Guan, "Mitigating stuck-cell failures in MLC NAND flash memory via inferred erasure decoding," *IEEE Trans. Very Large Scale Integr. (VLSI) Syst.*, vol. 25, no. 8, pp. 2285-2295, Aug. 2017.
59. C. A. Aslam, Y. L. Guan, K. Cai, and G. Han, "Low-complexity belief propagation (BP) decoding via dynamic silent-variable-node-free scheduling," *IEEE Commun. Lett.*, vol. 21, no. 1, pp. 28 – 31, Jan. 2017.
60. C. A. Aslam, Y. L. Guan, K. Cai, and G. Han, "Informed fixed scheduling for faster convergence of shuffled belief-propagation (BP) decoding," *IEEE Commun. Lett.*, vol. 21, no. 1, pp. 32 – 35, Jan. 2017.
61. C. A. Aslam, Y. L. Guan, and K. Cai, "Retention-aware belief-propagation decoding for NAND flash memory," *IEEE Trans. Circuits Syst. II, Exp. Briefs.*, vol. 64, no. 6, pp 725 – 729, June 2017
62. Z. Qin, K. Cai, and Y. Ng, "Iterative Detection and Decoding for Nonbinary LDPC Coded Partial-Response Channels with Written-in Errors", *IET Communications*, vol 10, no. 4, pp 399-406, 2016.
63. C. A. Aslam, Y. L. Guan, and K. Cai, "Read and Write Voltage Signal Optimization for Multi-Level-Cell (MLC) NAND Flash Memory," *IEEE Transactions on Communications*, vol. 64, no. 4, pp 1613-1623, Feb. 2016
64. C. A. Aslam, Y. L. Guan, and K. Cai, "Detector for MLC NAND Flash Memory Using Neighbor-A-Priori Information," *IEEE Transactions on Very Large Scale Integration (VLSI) Systems*, vol. PP, issue 90, pp 1-10, Feb. 2016.
65. Chua, K. Cai, and W.L. Goh, "Efficient Two-Write WOM-codes for Non-Volatile Memories", *IEEE Trans. Commun. Lett.*, vol. 19, no. 10, pp. 1690-1693, Oct. 2015.
66. Y. Ng, K. Cai, K.S. Chan, M.R. Elidrissi, and Z. Yuan, "Signal processing for dedicated servo recording system", *IEEE Trans. Magnetic*, vol. 51, no. 10, Article #: 3000905, Oct. 2015.
67. B. Chen, K. Cai, G.C. Han, S.T. Lim, and M. Tran, "A portable dynamic switching model for perpendicular magnetic tunnel junctions considering both thermal and process variations", *IEEE Trans. Magnetic*, vol. 51, no. 11, Article #:1300704, Nov. 2015.
68. C. A. Aslam, Y. L. Guan and K. Cai, "Improving the Belief-Propagation Convergence of Irregular LDPC Codes Using Column-Weight Based Scheduling," *IEEE Trans. Commun. Lett.*, vol. 19, no. 8, pp. 1283-1286, Aug. 2015.
69. Z.M. Yuan, J. Shi, C.L. Ong, P.S. Alexopoulos, C. Du, A. Kong, S. Ang, B. Santoso, S. H. Leong, K. S. Chan, Y. Ng, K. Cai, J. Tsai, H. Ng, H. K. Tan, "Dedicated servo recording system and performance evaluation," *IEEE Trans. Magnetic*, vol. 51, no. 4, Article #: 3100507, April 2015.
70. K. Cai, "Vertical constrained coding for phase-change memory with thermal crosstalk", *Journal of Communications*, April 2014.
71. G. J. Han, Y.L. Guan, K. Cai, K.S. Chan, and L.J. Kong, "Coding and detection for channels with written-in errors and inter-symbol interference", *IEEE Trans. Magnetics*, vol. 50, No. 10, # 3101106, Oct. 2014.
72. 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*, accepted.
73. K. Cai, Z. Qin, and B. Chen, "Channel capacity and soft-decision decoding of LDPC codes for spin-torch transfer magnetic random access memory (STT-MRAM)", *Journal of Communications*, vol. 8, No. 4, pp. 225-232, April 2013.
74. Y. Ng, K. Cai, B.V.K. Kumar, Z. Qin, and T.C. Chong, "Bi-directional pattern-dependent noise prediction with LDPC codes for heat-assisted magnetic recording", *IEEE Trans. Magnetic*, vol. 49, No. 6, pp. 2662-2664, Jun. 2013.
75. Z. Qin, K. Cai, and K.S. Chan, "Iterative reduced-complexity detection for LDPC-coded 2-D Recording Channels", *IEEE Trans. Magnetic*, vol. 49, No. 6, pp. 2598-2602, Jun. 2013.

76. S. Zhang, K. Cai, and Z. Qin, "A position dependent binary symmetric channel model for BPMR write errors", *IEEE Trans. Magnetics*, vol. 49, No. 6, pp. 2582-2585, Jun. 2013.
77. G. J. Han, Y.L. Guan, K. Cai, and K.S. Chan, "Asymmetric iterative multi-track detection for 2D non-binary LDPC coded magnetic recording", *IEEE Trans. Magnetic*, vol. 49, No. 10, pp. 5215-5221, Jun. 2013.
78. G. J. Han, Y.L. Guan, K. Cai, K.S. Chan, and L.J. Kong, "Embedded marker code for channels corrupted by insertions, deletions, and AWGN", *IEEE Trans. Magnetics*, vol. 49, No. 6, pp. 2535-2538, Jun. 2013.
79. Y. Ng, K. Cai, B.V.K. Kumar, T.C Chong, S. Zhang, and B. Chen, "Channel modeling and equalizer design for staggered islands bit-patterned media recording", *IEEE Trans. Magnetics*, vol. 48, No. 6, pp. 1976-1983, Jun. 2012.
80. Y. Ng, B.V.K. Kumar, K. Cai, R. Radhakrishnan, and T.C Chong, "Bi-directional pattern-dependent noise prediction for heat-assisted magnetic recording with high jitter noise", *IEEE Trans. Magnetics*, vol. 48, No. 5, pp. 1819-1825, May 2012.
81. S. Zhang, K. Cai, M. L. J. Zhang, K.K. Teo, W.E. Wong, and E.T. Ong, "Timing and written-in errors characterization for bit patterned media," *IEEE Trans. Magnetics*, vol. 47, No. 10, pp. 2555-2558, Oct. 2011.
82. M. Shaghghi, K. Cai, Y.L. Guan, Z. Qin, "Markov chain monte carlo based detection for two-dimensional intersymbol interference channels," *IEEE Trans. Magnetics*, vol. 47, No. 2, pp. 471-478, Feb. 2011.
83. K. Cai, Kees. Immink, Y.X. Lee, Z. Qin, and T.C. Chong, "Distance-enhancing constrained codes with parity-check constraints for data storage channels", *IEEE Journal on Selected Areas in Communications*, vol. 28, No. 2, pp 208-217, Feb. 2010.
84. Y. Ng, B.V.K. Kumar, K. Cai, S. Nabavi, and T.C Chong, "Investigation of PicketShift codes for bit-patterned media channels with insertion/deletion errors", *IEEE Trans. Magnetics*, vol. 46, No. 6, pp. 2268-2271, Jun. 2010.
85. S. Zhang, K.S. Chai, Cai, B. Chen, Z. Qin, and S.M. Foo, "Write failure analysis for bit-patterned media recording and its impact on read channel modeling," *IEEE Trans. Magnetics*, vol. 46, No. 6, pp. 1363-1365, Jun. 2010.
86. Kees Immink and K. Cai, "Simple class of constrained systems with unconstrained positions that outperform the maxentropic bound", *IEEE Transactions on Information Theory*, vol. 55, No. 5, pp 2000-2003, May 2009.
87. X. Zou, Z. Qin, and K. 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, issue 22, pp. 3128-3131, Nov. 2008.
88. Z. Qin, K. Cai, and X. Zou, "A reduced-complexity iterative receiver based on simulated annealing for coded partial-response channels," *IEEE Transactions on Magnetics*, vol 43, no. 6, pp 2265-2267, Jun. 2007.
89. K. Cai and K.A.S. Immink, "A general construction of constrained parity-check codes for optical recording", *IEEE Transactions on Communications*, vol. 56, no. 7, pp. 1070-1079, Jul. 2008.
90. K. Cai, K.A.S. Immink, Z. Qin, and L.P. Shi, "Error correction code failure rate analysis for parity-check-coded optical recording systems", *Japanese Journal of Applied Physics*, vol. 47, no. 7, pp. 5870-5874, 2008.
91. K. Cai, and Kees. Immink, "On the number of encoder states for a type of RLL codes", *IEEE Transactions on Information Theory*, vol. 52, no. 7, pp. 3313-3319, Jul. 2006.
92. K. Cai, Kees. Immink, J.W.M. Bergmans, and L.P. Shi, "Constrained parity-check code and post-processor for advanced blue laser disc systems," *Japanese Journal of Applied Physics*, vol. 45, no. 2B, pp. 1071-1078, Feb. 2006.
93. K. Cai, J.W.M. Bergmans, Z. Qin, A. Padiy, and W. Coene, "Parity-check codes and post-processing for d=1 optical recording channels," *IEEE Transactions on Magnetics*, vol 41, no. 11, pp 4338-4340, Nov. 2005.

Selected Patents

1. **K. Cai**, A. Kong, Zhi-Min Yuan, "Run-length limited (RLL) codes," US patent, US20150310889A1, granted on 30/8/2016. **Licensed to Marvell Technology Group Ltd, USA.**
2. C. Bi, **K. Cai**, *et. al.*, "Data storage device," US patent, US20150146322A1, granted on 01/12/2015. **Licensed to Marvell Technology Group Ltd, USA.**