Lei Qian, Ph.D.

Associate Professor of Computer Science
Department of Computer Science and Data Science
School of Applied Computational Sciences, Meharry Medical College

a. Professional Preparation

Nanjing University, Nanjing, China	Mathematics	B.Sc
Nanjing University, Nanjing, China	Mathematics	M.Sc
National University of Singapore	Mathematics	Ph.D.
Indiana University, Bloomington, IN	Computer Science	M.Sc.
Indiana University, Bloomington, IN	Math and Comp. Sci.	Ph.D.

b. Appointments

2024~ Associate Professor, Department of Computer Science and Data Science, Meharry Medical College.
2012~ 2024 Associate Professor of Computer Science, Math and Comp. Sci. Dept., Fisk University
2022~ 2024 Director of Master's Program in Data Science, Fisk University
2006~ 2024 Discipline Coordinator of Computer Science, Math and Comp. Sci. Dept., Fisk University
2006~2012 Assistant Professor of Computer Science, Math and Comp. Sci. Dept., Fisk University
2004~2006: Research Scientist, Physics Department, Fisk University

c. Course Teaching and taught:

Teaching currently: Mathematical Modeling, Computer Organization, Programming Languages, Operating Systems, Theory of Computation, junior seminar, senior seminar, discrete mathematics

Taught in the past: Machine Learning, Bioinformatics, Databases, Computer Networks, Introduction to Computer Science, real analysis.

d. Other Research Activities:

PI of DOE MSIPP Research Program. *AI Enabled Blind Sensor Drift Calibration*. $261,750. 2024-2025
Co-PI (campus PI) of NSF ExLent program. Creating and Sustaining a Diverse Community of Expertise in Quantum Information Science (EQUIS) Across the South-Eastern United States. $90,000. 2023-2026
MPI (campus PI) of NIH BEST-DS2 Fisk-Meharry-VUMC R25 program. $405,000. 2022~2027
MPI (campus PI) of NIH FUTURE-MIND-QB Fisk-UIUC T32 bridge program, $1,000,078, 2020~2025
PI of NIH Big Data to Knowledge R25 Program (BD2K).1,018,114. 2015~2020
Co-PI of NSF HBCU-UP TIP program. Targeted Infusion Project: Strengthening Fisk University's Undergraduate STEM Curriculum. $400,000, 2016-2019.
Co-PI of NSF HBCU-UP TIP program. Targeted Infusion Project: Development of an Undergrad Bioinformatics and Biomathematics Track at Fisk University. $400,000, 2016-2019.
Co-PI (Campus PI). NSF. Tennessee State University - Fisk – Illinois Partnership for Research and Education in Materials (TSUFI-PREM). 2024-2029.

Pending Proposals:
Co-PI (Campus PI). NSF. ExpandQISE: Track2: Middle Tennessee QISE Consortium: HBCU-R2-R1 Partnership in Quantum Science Research and Education. 2024-2029.
Co-PI (Campus PI). NSF AI Institute for Understanding the Universe (AIU2). Leading University UIUC. 2024-2029.

e. Expertise:

- Computer Science: Machine Learning, Mathematical Modeling, Formal methods and verification, computer security.
- Optical Computing
- Pure Logic: Theory of Computability, Model Theory, Proof Theory

- Applied Logic: Optical Logic, epistemic logic, temporal logic, and dynamic logic.
- Programming languages: Python (including Numpy, Matlplotlib, Pandas, Tensorflow, Scikit-Learn), Java, C/C++, C#, Pascal, SQL, PHP, R, Matlab, Javascript, Scheme.

d. Publications

(i) Referred Journal Papers

1. Judith E. Canner, Archana J. McEligot, María-Eglée Pérez, Lei Qian, and Xinzhi Zhang. Enhancing Diversity in Biomedical Data Science. Ethnicity and Disease. Vol 27 (2017).
2. Minji Kim, Yeonsung Kim, Lei Qian, Jun S Song, TeachEnG: a Teaching Engine for Genomics. Bioinformatics, Vol 33 Issue 20 (2017) 3296-3298.
3. Yaseen, A., Nijim, M, Williams, B, Qian, L. and Li, Y. (2015) FLEXc: protein flexibility prediction using context-based statistics, predicted structural features, and sequence information. BMC Bioinformatics. 2016 Aug 31;17 Suppl 8:281.
4. H. John Caulfield, Andrey Zavalin, Lei Qian*, Zero-Energy Optical Logic: Can it be Practical? *Journal of Supercomputing, March* (2011) DOI: 10.1007 / s11227-011-0583-7 (* corresponding author)
5. H. J. Caulfield, R. A. Soref, L. Qian, A. Zavalin and J. Hardy. *Generalized Optical Logic Elements – GOLES.* Optics Communications. (2007).
6. H. John Caulfield, Lei Qian. *The Other Kind of Quantum Computing.* International Journal of Unconventional Computing. Vol 2. No. 3. 281-289 (2006)
7. L. Qian, H. J. Caulfield, *What can we do with a linear optical logic gate*, Information Sciences 176 (2006) 3379-3392.
8. H. J. Caulfield, J. Shamir, A. I. Zavalin, E. Silbermann, L. Qian, and C. S. Vikram. *Simple Online Recognition of Optical Data Strings Based on Conservative Optical Logic* , Applied Optics Vol 45 No. 17. 4069-4074 (2006)
9. L. Qian, H. J. Caulfield, *Abstract Passive Interferometers with Applications to Conservative Logic*. Optik 116(2005), 404-408.
10. C. T. Chong, L. Qian, T. A. Slaman and Y. Yang, *Sigma_2 induction and infinite injury priority arguments, part III: Prompt Sets, minimal pairs and Shoenfield's conjecture,* Israel Journal of Mathematics, vol. 121 (2001), 1-28.
11. L. Hong, D. Ding and L. Qian, *A Splitting with infimum in the d-c.e. degrees,* Mathematical Logic Quarterly, Vol. 46, 53-76 (2000)
12. D. Ding and L. Qian, *Isolated d.r.e. degrees are dense in r.e. degree structure.* Arch. Math. Logic 36 (1996), no. 1, 1--10.
13. D. Ding and L. Qian, *Isolated d-r.e. degree below r.e. degree.* Sci. China Ser. A 38 (1995), no. 4, 419-427.
14. K. L. Su, D. C. Ding, Z. W. Sun and L. Qian, *Class of models for a rejection by reasonal facts,* Chinese Journal of Computer, 17(1994), no.5, 361--366.
15. L. Qian and X. Zheng, *Lattice embedding properties of quasi-contiguous Degree,* Chinese Science Bulletin, Vol. 23 (1992), 2200--2202
16. X. Zheng and L. Qian *The hierarchy and Grzegorczyk's problem of multiple recursive functions.* Chinese Science Bulletin, 37(1992) no.15, 1319-1320
17. Lei Qian and Yiquan Zhou. *Model Theoretic Properties of Medium Logic*. Journal of Nanjing Aeronautical Institute. Vol 24. No. 3. 1992. 291-296.

(ii) Referred Conference Proceedings

1. Jacob Kutchi, Kendall Robbins, David De Leon, Michael Seek, Younghan Jung, Lei Qian, Richard Mu, Liang Hong, Yaohang Li, Blind Drift Calibration using Deep Learning Approach to Conventional Sensors on Structural Model. ICCEPM 2022, pp814-822.
2. T.Hansen, T. LeFebvre, M. Schultz, M.Romberg, A. Mysore, K. Holub, P. McCaslin, S. Sahm., A. Esterline, Y. Li, C. Baber, K. Fuller, Y. Pogue, W. Wright, M. Steinbach, R. Olobode, R. Fatland, M. Heavner, L. Qian. Earth Information Services. American Meteorology Society conference 2009.
3. H. J. Caulfield, Jim Hardy and Lei Qian. *Vector Logic Theorem Proving*, Proceedings of the Joint Conference on Information Sciences (2005)
4. C. T. Chong, L. Qian and Y. Yang, *The Friedberg jump inversion theorem revisited: a study of undefinable cuts.* Logic Colloquium '98 (Prague), 140--153, Lecture Notes in Mathematical Logic, 13, Assoc. Symbol. Logic, Urbana, IL, 2000.

5. D. Ding and L. Qian. *Lattice embedding into d-r.e. degrees preserving 0 and 1.* Proceedings of the Sixth Asian Logic Conference (Beijing, 1996), 67--81, World Sci. Publishing, River Edge, NJ, 1998.
6. L. Qian. *The Gentzen system of medium logic,* IEEE International Symposium on Multiple-Valued Logic, Guangzhou, China, 75-81,1989.

(iii) Book Chapters

1. H. John Caulfield and Lei Qian. The Thermodynamics of Computing. Encyclopedia of Complexity and System Science. Springer Science+Business Media (2009)
2. Lei Qian and H. John Caulfield. *Relocating the nonlinearity in optical logic.* in Nonlinear Optics and Applications. Published by the Research Signpost publishing company. Edited by Hossin A. Abdeldayem and Donald O. Frazier. 319-338. (2007)
3. H. John Caulfield, Lei Qian, C. S. Vikram, Andrey Zavalin, K. Chouffani, J. M. McCurdy, and Jonathan Westphal, *Conservative Optical Logic Devices.* In Adv. in Imag. and Elec. Physics, vol. 142. (2006)