DEBAJYOTI BERA, PH.D.

Assistant Professor, Computer Sc. Department
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INTERESTS Quantum Computing, Algorithms Engineering for Data Mining & Network Analysis, Theoretical Computer Science

EDUCATION

- **Ph.D.** in Computer Science, Boston University, Boston, Massachusetts, USA. August 2009
  Thesis: *Quantum Circuits: Power and Limitations (Advisor: Prof. Steve Homer)*
- **B.Tech.** in Computer Science & Engineering, Indian Institute of Technology, Kanpur, India. 2002

WORK EXPERIENCE

- Asst. Professor, IIIT-Delhi, New Delhi. Since Jan 2010.
- Teaching Assistant & Research Assistant, Dept. of Computer Science, Boston University, USA. 2003-2009.
- Mentor, Google Summer of Code for Beagle project. Summer 2007.
- Software Developer, Adobe Systems India Pvt. Ltd. 2002.

JOURNAL PUBLICATIONS (selected)

2010 **1.** Debajyoti Bera, Stephen Fenner, Frederic Green, and Steven Homer. Efficient universal quantum circuits. *Quantum Information & Computation*, 10(1):16–28, 2010

2015 **2.** Debajyoti Bera. A different Deutsch–Jozsa. *Quantum Information Processing*, 14(6):1777–1785, 2015

3. Khalique Newaz, K Sriram, and Debajyoti Bera. Identification of major signaling pathways in prion disease progression using network analysis. *PloS one*, 10(12):e0144389, 2015

2017 **4.** Siddharth Dawar, Vikram Goyal, and Debajyoti Bera. A hybrid framework for mining high-utility itemsets in a sparse transaction database. *Applied Intelligence*, 47(3):809–827, Oct 2017

2018 **5.** Debajyoti Bera. Detection and diagnosis of single faults in quantum circuits. *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (IEEE TCAD)*, 37(3):587–600, March 2018

2019 **6.** Debajyoti Bera and Tharrmashastha P. V. Error reduction of quantum algorithms. *Phys. Rev. A*, 100:012331, Jul 2019

2021 **7.** Debajyoti Bera and SAPV Tharrmashastha. Quantum and randomised algorithms for non-linearity estimation. *ACM Transactions on Quantum Computing*, 2(2), July 2021

8. Debajyoti Bera, Rameshwar Pratap, Bhisham Dev Verma, Biswadeep Sen, and Tanmoy Chakraborty. Quint: Node embedding using network hashing. *IEEE Transactions on Knowledge and Data Engineering*, pages 1–1, 2021

REFEREED CONFERENCE AND WORKSHOP PUBLICATIONS (selected)

2009 **1.** Debajyoti Bera, Stephen Fenner, Frederic Green, and Steve Homer. Efficient universal quantum circuits. In *Computing and Combinatorics (COCOON)*, pages 418–428, Berlin, Heidelberg, 2009. Springer Berlin Heidelberg

2016 **2.** Jyoti Leeka, Srikanta Bedathur, Debajyoti Bera, and Medha Atre. Quark-x: An efficient top-k processing framework for rdf quad stores. In *Proceedings of the 25th ACM International on Conference on Information and Knowledge Management (CIKM)*, pages 831–840. ACM, 2016

3. Debajyoti Bera and Rameshwar Pratap. Frequent-itemset mining using locality-sensitive hashing. In *International Computing and Combinatorics Conference (COCOON)*, pages 143–155. Springer International Publishing, 2016

4. Charudatt Pachorkar, Meher Chaitanya, Kishore Kothapalli, and Debajyoti Bera. Efficient parallel ear decomposition of graphs with application to betweenness-centrality. In *High Performance Computing (HiPC), 2016 IEEE 23rd International Conference on*, pages 301–310. IEEE, 2016 **(Best paper award)**

2018 **5.** Debajyoti Bera. Amplitude amplification for operator identification and randomized classes. In *Computing and Combinatorics - 24th International Conference, COCOON 2018, China, Proceedings*, pages 579–591, Cham, 2018. Springer International Publishing

2019 **6.** Debajyoti Bera, Subhamoy Maitra, and Sapv Tharrmashastha. Efficient quantum algorithms related to autocorrelation spectrum. In Feng Hao, Sushmita Ruj, and Sourav Sen Gupta, editors, *Progress in Cryptology – INDOCRYPT 2019*, pages 415–432, Cham, 2019. Springer International Publishing

7. Rameshwar Pratap, Debajyoti Bera, and Karthik Revanuru. Efficient sketching algorithm for sparse binary data. In *2019 IEEE International Conference on Data Mining (ICDM)*, pages 508–517, 2019

2020 **8.** Baani Leen Kaur Jolly, Lavina Jain, Debajyoti Bera, and Tanmoy Chakraborty. Unsupervised anomaly detection in journal-level citation networks. In *Proceedings of the ACM/IEEE Joint Conference on Digital Libraries in 2020*, JCDL '20, page 27–36, New York, NY, USA, 2020. Association for Computing Machinery

OTHER PUBLICATIONS

1. *Invited Article:* Debajyoti Bera, Frederic Green, and Steven Homer. Small depth quantum circuits. *ACM SIGACT News*, 38(2):35–50, 2007
2. *Monograph:* Quantum Circuit Complexity: Low Depth Quantum Circuits: Power and Limitations. ISBN: 978-3-8383-8348-4. Lambert Academic Publishing.
3. *Book:* Tharrmashastha SAPV, Debajyoti Bera, Arpita Maitra, and Subhamoy Maitra. *Quantum Algorithms for Cryptographically Significant Boolean Functions*. SPRINGER Singapore, 1st edition, 2021

TEACHING EXPERIENCE, INVITED LECTURES AND TUTORIALS

- Courses taught and designed at IIIT-Delhi (since January 2010): **a)** Analysis and Design of Algorithms (Undergraduate Algorithms) **b)** Theory of Computation **c)** Advanced Algorithms **d)** Randomised Algorithms **e)** Theory of Modern Cryptography **f)** Graduate Algorithms **g)** P vs NP **h)** Complexity Theory **i)** Introduction to Quantum Computing
- *Introduction to Quantum Computing*: video lecture as part of MHRD project recorded at IIT-Delhi, New Delhi (August 2011)
- Lectures in summer schools/workshops at ISI Kolkata (on cryptography and complexity in 2016, 2017, 2018), IIIT-Delhi (for computer science school teachers in 2015), IIIT-Delhi (INOI preparatory workshop, 2014).
- Invited seminar at QANSAS (DEI, Agra), TCS Innovation Labs (Kolkata), Ashoka University, Trinity Institute of Professional Studies (Dwarka, New Delhi), CDAC Pune, IndoQuant 2018 (IIT Hyderabad), IETE Golden Jubilee Mid Term Symposium at NSUT (New Delhi)
- FDP (Faculty Development Program) lectures are JNTUA College of Engineering (Andhra Pradesh), Vardhman College of Engineering (Hyderabad), IIIT Kottayam (Kerala).

SPONSORED RESEARCH PROJECTS

1. Successfully completed a 15-month project titled "Feasibility Study for Design of a Quantum based Random Number Generator (QRNG) and it's Detailed Analysis" of amount ₹9,60,000.00 funded by DRDO, Govt. of India.

PhD SUPERVISIONS:

1. Siddharth Dawar, *High-utility Itemset Mining.* Defended in 2021. (co-advisor: Vikram Goyal)
2. Anuj Saxena, *Privacy of Location Based Services.* Defended in 2019. (co-advisor: Vikram Goyal)

SELECTED PROFESSIONAL ACTIVITIES

- External Expert for curriculum design, examination paper moderation, etc. for Computer Science UG, PG and Ph.D. programs at Indira Gandhi National Open University, New Delhi.
- Book and Book Proposal Reviewer for many publishers including Springer, Tata McGraw Hill.
- Reviewer of papers for journals and conference in areas of theoretical computer science and quantum computing.
- Proposal evaluation committee and project monitoring committee, invited by TDB, DST, Govt. of India
- Member of TPC of *International Conference on Contemporary Computing* (IC3) 2015, IC3 2016. Co-chair of Algorithms track, IC3 2018.
- Member of Senate at IIIT-Delhi (2011-2013)