Subhadeep Sarkar

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RESEARCH INTERESTS

I am interested in designing **privacy-aware data systems**. I work at the intersection of designing **data layouts and access methods for storage engines** and developing **systems-level solutions for privacy protection** in modern data systems. The goal of my research is to bridge the gap between the legal requirements and performance expectations in database systems by navigating the privacy-performance tradeoff and designing privacy-aware data structures and algorithms. I also take interest in **data management challenges in cloud/fog computing frameworks**.

PROFESSIONAL EXPERIENCE

01/2019 - present	**Post-doctoral Associate** at Boston University, MA, USA Department of Computer Science, College of Arts & Sciences *Advisor*: Manos Athanassoulis.
01/2023 - present 01/2020 - 05/2020	**Lecturer** at Boston University, MA, USA Department of Computer Science, College of Arts & Sciences
02/2017 - 10/2018	**Post-doctoral Researcher** at Inria Rennes – Bretagne Atlantique, France Myriads projects team *Advisor*: Christine Morin
07/2013 - 06/2017	**Ph.D. Scholar** at Indian Institute of Technology Kharagpur, India Department of Computer Science & Engineering; School of Medical Science & Technology *Advisors*: Sudip Misra and Chandan Chakraborty.
10/2014 - 09/2016	**Senior Research Fellow** at Indian Institute of Technology Kharagpur, India Department of Computer Science & Engineering
04/2013 - 09/2014	**Junior Research Fellow** at Indian Institute of Technology Kharagpur, India School of Information Technology

EDUCATION

2013 - 2017	**Doctor of Philosophy (Ph.D.)** Indian Institute of Technology Kharagpur, India *Specialization*: Wireless communication in sensor networks *Dissertation*: "Analysis of Delay in Wireless Communication for Healthcare Systems"
2008 - 2012	**Bachelor of Technology (B.Tech.)** Institute of Engineering and Management, Kolkata, India *Specialization*: Computer Science and Engineering *Dissertation*: "One World Vigilant Online Surveillance System"

AWARDS AND ACHIEVEMENTS

2022 | Invited for a full talk at the **invitation-only workshop** on *High Performance Transaction Systems (HPTS)*.

2020 | Selected for a **spotlight talk** at *North-East Database Day (NEDBD)*.

2018 | **Marie Sklodowska-Curie Actions Seal of Excellence** by the European Commission. [*url*]

2016 | Selected as **Most qualified young scientist** to attend the 4^{th} Heidelberg Laureate Forum, Germany.

2015 | **Second best Ph.D. Thesis award** at the 5^{th} IDRBT Doctoral Colloquium organized by Institute for Development and Research in Banking Technology (IDRBT).

2015 | **Senior research fellowship** from the Ministry of Human Resource Development (MHRD), Govt. of India (*fellowship duration*: 10/2015 - 09/2016).

2015 | **International travel grant** from Ministry of Human Resource Development, Govt. of India for IEEE ICC.

2014 | **Honorary certificate of appreciation** from the IEEE Communications Society at the IEEE ComSoc Student Competition.

2013 | **Research fellowship** from the Department of Electronics and Information Technology, Govt. of India (*fellowship duration*: 04/2013 - 09/2015).

2012 | **Ranked 1885** (among 156,782 candidates) nationally in Graduate Aptitude Test in Engineering (GATE).

2010 | **Ranked** among the **top 2%** in 6^{th} National Aptitude Test held by NIIT.

2006 | **National Merit scholarship of Government of India** for securing a **state rank of 37** (among 764,933 candidates) in secondary board examination.

PUBLICATIONS

Patents

INDIAN PATENT 2016 | **S. Sarkar**, S. Chatterjee, S. Misra, E. A. Ansari, D. Ghatak, S. Sarkar, "A Privacy-Aware Ambulatory Healthcare System Using Wireless Body Area Networks (WBANs)", Indian Patent, File no.: 201631000214, 2016.

Books

CRC PRESS T&F 2019 | S. Misra, **S. Sarkar**, and S. Chatterjee, "Sensors, Cloud, and Fog: The Enabling Technologies for the Internet of Things", *CRC Press, Taylor & Francis Group*, ISBN 9780367196127, 2019.

Journals and Journal-Equivalent Conference Papers

ToDS 2023 | **S. Sarkar**, T. I. Papon, Z. Zhu, D. Staratzis, and M. Athanassoulis, "Enabling Timely and Persistent Deletion in LSM-Engines", *ACM Transactions on Database Systems*, 2023. (*Accepted for publication*)

ICDE 2023 | **S. Sarkar**, N. Dayan, and M. Athanassoulis, "The LSM Design Space and its Read Optimizations", *In Proceedings of the IEEE International Conference on Data Engineering*, 2023.

ICDE 2023 | A. Raman, **S. Sarkar**, M. Olma, and M. Athanassoulis, "Indexing for Near-Sorted Data", *In Proceedings of the IEEE International Conference on Data Engineering*, 2023.

SIGMOD 2022 | **S. Sarkar** and M. Athanassoulis, "Dissecting, Designing, and Optimizing LSM-based Data Stores", *In Proc. of the ACM SIGMOD International Conference on Management of Data*, 2022.

DEBull 2022	M. Athanassoulis, **S. Sarkar**, T. I. Papon, Z. Zhu, and D. Staratzis, "Building Deletion-Compliant Data Systems", *IEEE Data Engineering Bulletin*, vol. 45(1), 2022.
EDBT 2022	**S. Sarkar** and M. Athanassoulis, "Query Language Support for Timely Data Deletion", *In Proc. of the International Conference on Extending Database Technology*, 2022.
PVLDB 2021	**S. Sarkar**, D. Staratzis, Z. Zhu, and M. Athanassoulis, "Constructing and Analyzing the LSM Compaction Design Space", *In Proc. of the Very Large Databases Endowment*, vol. 14(11), 2021.
SIGMOD 2020	**S. Sarkar**, T. I. Papon, D. Staratzis, and M. Athanassoulis, "Lethe: A Tunable Delete-Aware LSM Engine", *In Proc. of the ACM SIGMOD International Conference on Management of Data*, 2020.
SYSTEMS J. 2020	S. Misra, P. K. Bishoyi, and **S. Sarkar**, "i-MAC: In-Body Sensor MAC in Wireless Body Area Networks for Healthcare IoT", *IEEE Systems Journal*, vol. 15(3), 2020.
COMM. LETTERS 2017	**S. Sarkar**, S. Chatterjee, S. Misra, and R. Kudupudi, "Privacy-Aware Blind Cloud Framework for Advanced Healthcare", *IEEE Communications Letters*, vol. 21(11), 2017.
COMP. NET. 2017	P. Bhavathankar, **S. Sarkar**, and S. Misra, "Optimal Decision Rule-Based Ex-ante Frequency Hopping for Jamming Avoidance in Wireless Sensor Networks", *Computer Network, Elsevier*, vol. 128, 2017.
TCC 2016	**S. Sarkar**, S. Chatterjee, and S. Misra, "Assessment of the Suitability of Fog Computing in the Context of Internet of Things", *IEEE Transactions on Cloud Computing*, vol. 6(1), 2016.
PULSE 2016	**S. Sarkar** and S. Misra, "From Micro to Nano: The Evolution of Wireless Sensor-Based Health Care", *IEEE PULSE*, vol. 7(1), 2016.
IET NET. 2016	**S. Sarkar** and S. Misra, "Theoretical Modeling of Fog Computing: A Green Computing Paradigm to Support IoT Applications", *IET Networks*, vol. 5(2), 2016.
GLOBECOM 2016	**S. Sarkar**, S. Misra, and M. S. Obaidat, "Resource Allocation for Wireless Body Area Networks in Presence of Selfish Agents", *In Proc. of the IEEE Global Communications Conference*, 2016.
TC 2015	**S. Sarkar**, S. Misra, B. Bandyopadhyay, C. Chakraborty, and M. S. Obaidat, "Performance Analysis of IEEE 802.15.6 MAC Protocol Under Non-ideal Channel Conditions and Saturated Traffic Regime", *IEEE Transactions on Computers*, vol. 64(10), 2015.
JBHI 2015	S. Misra and **S. Sarkar**, "Priority-Based Time-Slot Allocation in Wireless Body Area Networks During Medical Emergency Situations: An Evolutionary Game Theoretic Perspective", *IEEE Journal of Biomedical and Health Informatics*, vol. 19(2), 2015.
CLOUD COMP. 2014	**S. Sarkar**, S. Chatterjee, and S. Misra, "Evacuation and Emergency Management Using a Federated Cloud", *IEEE Cloud Computing*, vol. 1(4), 2014.
GLOBECOM 2014	**S. Sarkar**, S. Misra, C. Chakraborty, and M. S. Obaidat, "Analysis of Reliability and Throughput under Saturation Condition of IEEE 802.15.6 CSMA/CA for Wireless Body Area Networks", *In Proc. of the IEEE Global Communications Conference*, 2014.

Other Conference and Workshop Papers

TPCTC 2022	A. Raman, K. Karatsenidis, **S. Sarkar**, M. Olma, M. Athanassoulis, "BODS: A Benchmark on Data Sortedness", *In Proc. of the TPC Tech. Conf. on Performance Evaluation & Benchmarking*, 2022.
iThings 2018	**S. Sarkar**, J.-P. Banatre, L. Rilling, and C. Morin, "Towards Enforcement of the EU GDPR: Enabling Data Erasure", *IEEE International Conference on Internet of Things*, 2018.

ICC 2015	S. Chatterjee, **S. Sarkar**, and S. Misra, "Quantification of Node Misbehavior in Wireless Sensor Networks: A Social Choice-Based Approach", *IEEE International Conference on Communications Workshops*, 2015.
AIMoC 2015	S. Chatterjee, **S. Sarkar**, and S. Misra, "Energy-Efficient Data Transmission in Sensor-Cloud", *International Conference on Applications and Innovations in Mobile Computing*, 2015.

Demo Papers

SIGMOD 2023	Z. Zhu, **S. Sarkar**, and M. Athanassoulis, "Acheron: Persisting Tombstones in LSM Engines", *In Proc. of the ACM SIGMOD International Conference on Management of Data*, 2023. [Demo website] (Accepted for publication)
SIGMOD 2022	**S. Sarkar**, K. Chen, Z. Zhu, and M. Athanassoulis, "Compactionary: A Dictionary for LSM Compactions", *In Proc. of the ACM SIGMOD International Conference on Management of Data*, 2022. [Demo website]

Invited Talks and Lectures

12/2022	"Constructing and Analyzing the LSM Compaction Design Space", **MongoDB**, USA.
10/2022	"Toward Building Deletion Compliant Data Systems", **HTPS Workshop (*Invitation-only*)**, CA, USA.
07/2021	"Enabling Efficient Deletes in Log-Structured KV-Stores", **Microsoft Research**, Redmond, USA.
02/2021	"Enabling Efficient Deletes in Log-Structured Key-Value Stores", Guest Lecture at **Boston University**, MA, USA.
07/2020	"Lethe: A Tunable Delete-Aware LSM-Based Storage Engine", **Alibaba Cloud**, China.
01/2020	"Lethe: A Tunable Delete-Aware LSM-Based Storage Engine", North East DB Day, **MIT**, USA. [Spotlight talk]
07/2018	"Personal Data Management in Cloud-based IoT", Guest lecture at **University of Rennes 1**, France.
03/2018	"Enabling Privacy by Design in the Context of the Internet of Things", **University of Rennes 1**, France.
03/2018	"Enabling Privacy by Design in the Context of the Internet of Things", **Université Pierre-et-Marie-Curie**, Paris, France.
02/2018	"Enabling Privacy by Design in the Context of the Internet of Things", **CentraleSupélec – Rennes Campus**, France.
02/2018	"Enabling Privacy by Design in the Context of the Internet of Things", **Laboratoire d'InfoRmatique en Image et Systèmes d'information (LIRIS)**, Lyon, France.
09/2015	"Fog computing and Internet of Things", Guest Lecture at **Indian Institute of Technology Kharagpur**, India.
09/2015	"WBANs: IEEE 802.15.6", Guest Lecture at **Indian Institute of Technology Kharagpur**, India.
07/2015	"Importance of WBAN-Based Healthcare in the Context of IoT", Guest Lecture at **Indian Institute of Technology Kharagpur**, India.

Conference Talks

06/2022 | "Dissecting, Designing, & Optimizing LSM-based Data Stores", **ACM SIGMOD**, Philadelphia, USA.

06/2022 | "Compactionary: A Dictionary for LSM Compactions", **ACM SIGMOD**, Philadelphia, USA.

04/2022 | "Query Language Support for Timely Data Deletion", **EDBT**, Edinburgh, UK.

08/2021 | "Constructing and Analyzing the LSM Compaction Design Space", **VLDB**, Copenhagen, Denmark.

07/2020 | "Lethe: A Tunable Delete-Aware LSM Engine", **ACM SIGMOD**, Portland, USA.

08/2018 | "Towards Enforcement of the EU GDPRR: Enabling Data Erasure", **IEEE iThings**, Halifax, Canada.

06/2015 | "Quantification of Node Misbehavior in Wireless Sensor Networks: A Social Choice-Based Approach", **IEEE ICC Workshops**, London, UK.

06/2015 | "Energy-Efficient Data Trransmission in Sensor-Cloud", **AIMoC**, Kolkata, India.

TEACHING EXPERIENCE

Lecturer

Spring, 2023 | *Course*: **Data Systems Architectures** (CAS CS-561) [Website]
Institute: Boston University, MA, USA
Student strength: approx. 35
Course evaluation: Available after 05/2023

Spring, 2020 | *Course*: **Fundamentals of Computing Systems** (CAS CS-350) [Website]
Institute: Boston University, MA, USA
Student strength: 95
Course evaluation: 4.36/5.00 (Full report available upon request)

Teaching assistant

Fall, 2021 | *Course*: **Introduction to Database Systems** (CAS CS-460) [Website]
Course instructor: Manos Athanassoulis
Institute: Boston University, MA, USA

Fall, 2020 | *Course*: **Introduction to Database Systems** (CAS CS-460) [Website]
Course instructor: Manos Athanassoulis
Institute: Boston University, MA, USA

Spring, 2019 | *Course*: **Data Systems Architectures** (CAS CS-591-A1) [Website]
Course instructor: Manos Athanassoulis
Institute: Boston University, MA, USA

Autumn, 2015 | *Course*: **Wireless Ad-Hoc and Sensor Networks** (IT60119)
Course instructor: Sudip Misra
Institute: Indian Institute of Technology Kharagpur, India

SUPERVISION AND MENTORSHIP EXPERIENCE

At Boston University

Master students

Kaijie Chen (Boston University, MA, USA) *Jun'21-Jan'22*
Research topic: Visualizing compactions in LSM-trees

Guanting Chen (Boston University, MA, USA) *Jun'19-Jun'20*
Research topic: Analyzing compactions in LSM-trees

Undergraduate students

Aaron Ang (Boston University, MA, USA) *Nov'22-Present*
Research topic: Enabling timely data deletion support in SQL

RISE interns / High school interns

Venkat Subramanian (Bridgewater-Raritan High School, NJ, USA) *Jul-Aug'22*
Research topic: Visualizing timely data deletion in LSM-engines

Grace Sun (Niskayuna High School, NY, USA) *Jul-Aug'22*
Research topic: Visualizing timely data deletion in LSM-engines

Naomi Johnson (Amherst Regional High School, MA, USA) *Jul-Aug'19*
Research topic: Workload generation for testing query-driven data-agnostic data partitioning

Kevin Xu (Skyline High School, WA, USA) *Jul-Aug'19*
Research topic: Query-driven data-agnostic data partitioning

At Indian Institute of Technology Kharagpur

Doctoral candidates

Pradyumna Bishoi (IIT Kharagpur, India) *Apr-Dec'17*
Research topic: Jamming avoidance in wireless sensor networks

Prasenjit Bhavathankar (IIT Kharagpur, India) *Sep'16-Jan'17*
Research topic: Designing MAC protocols for WBANs

Master students

Amit Samanta (IIT Kharagpur, India) *May'16-Aug'17*
Research topic: Designing MAC protocols for WBANs

Undergraduate interns

Rajesh Kudupudi (IIITDM, Kancheepuram, India) *May-Jul'16*
Research topic: Testing of a WBAN-based cloud-assisted ambulatory healthcare system

Ananya Konar (NIT Durgapur, India) *May-Jul'16*
Research topic: Testing of a WBAN-based cloud-assisted ambulatory healthcare system

Dipayan Ghatak (IIEST, Shibpur, India) *May-Jul'15*
Research topic: Development of a WBAN-based cloud-assisted ambulatory healthcare system

Ezaj Ahmed Ansari (NIT Durgapur, India) *May-Jul'15*
Research topic: Development of a WBAN-based cloud-assisted ambulatory healthcare system

Amogh K. Vedamurthy (SBBR Mahajana First Grade College, Mysore, India) *Jan-Mar'15*
Research topic: Development of healthcare data analytic system using WBANs

Khadija Chowdhry (NIT Durgapur, India) *May-Jul'14*
Research topic: Latency analysis in IEEE 802.15.6 WBAN-based communications

Rachit Daga (NIT Durgapur, India) *May-Jul'14*
Research topic: Real implementation of big-sensor-cloud infrastructure

Manmeet Singh Bhogal (NIT Durgapur, India) *May-Jul'14*
Research topic: Real implementation of big-sensor-cloud infrastructure

Bitan Bandyopadhyay (Jadavpur University, Kolkata, India) *Dec'13-Jan'14*
Research topic: Performance analysis of the IEEE 802.15.6 communication standard

PROFESSIONAL SERVICES

Organization

Web Chair, ACM SIGMOD, Reproducibility and Availability, 2023, 2022.
Sponsorship Chair, ACM Symposium on Cloud Computing (SoCC), 2022.

Program committee member

PVLDB, Demonstration, 2023, 2022.
International Conference on Extending Database Technology (EDBT), 2023.
ACM Symposium on Cloud Computing (SoCC), 2022.
ACM International Conference on Distributed and Event-Based Systems (DEBS), 2022, 2021.
IEEE International Conference on Big Data (BigData), 2022.
IEEE International Conference on Data Engineering (ICDE), 2022.
ACM SIGMOD, Demonstration, 2021.
The Web Conference, 2020.
IEEE SmartData, 2019.
ACM SIGMOD, Reproducibility, 2018.
MobiCom workshop on Future Industrial Communication Networks (FICN), 2018.
EuroSys, 2018. (*Shadow PC*)
International Conference on Advanced Computing, Networking, and Informatics, 2018.
International Conference on Advanced Computing and Intelligent Engineering, 2017, 2016.

Reviewer: International journals

International Journal on Very Large Data Bases (VLDBJ), ACM Transactions on Database Systems, Journal of Systems Architecture (Elsevier), IEEE Transactions on Parallel and Distributed Systems, IEEE Transactions on Mobile Computing, IEEE Transactions on Cloud Computing, IEEE Transactions on Vehicular Technology, IEEE Transactions on Big Data, IEEE Transactions on Green Communications and Networking, IEEE Transactions on Industrial Informatics, IEEE Systems Journal, IEEE Communications Letters, IEEE Wireless Communications Letters, IEEE Wireless Communications Magazine, IEEE Communications Magazine, IEEE Vehicular Technology Magazine, International Journal of Communication Systems (Wiley).

Reviewer: Peer-reviewed conferences

CIDR [2023], PVLDB [2022, 2021], IEEE International Conference on Big Data (BigData) [2021, 2017], Euro-Par [2018], International Conference on Distributed Computing Systems (ICDCS) [2017], International Conference on Cloud Computing Technology and Sciences (CloudCom) [2017], IEEE Conference on Network Function Virtualization and Software Defined Networks (NFV-SDN) [2017], IEEE International Conference on Fog and Edge Computing (ICFEC) [2018, 2017], International Conference on Electronics, Communications and Networks (CECNet) [2017], IEEE Wireless Communications and Networking Conference (WCNC) [2016], International Conference on Software, Telecommunications and Computer Networks (SoftCOM) [2016], IEEE International Conference on Advanced Networks and Telecommunications Systems (ANTS) [2016, 2015], IEEE Students' Technology Symposium (TechSym) [2014].