Sayan Biswas

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Personal Homepage

Research interests

Decentralized Learning; Federated Learning; Ethical ML focusing on Privacy, Fairness, and Personalization; Location Privacy.

Positions

2023 - present **Postdoctoral Researcher** at EPFL (Scalable Computing Systems Lab) – Lausanne, Switzerland.
Supervisor: Prof. Anne-Marie Kermarrec.

Education

2020 - 2023 **PhD in Computer Science** from INRIA, École Polytechnique, and Institut Polytechnique de Paris – Palaiseau, France.
IP Paris Award for the Best PhD Thesis in Computer Science.
Supervisor: Prof. Catuscia Palamidessi.

2016 - 2020 **Master of Mathematics (M.Math.)** with **First-Class Honours** from University of Bath – Bath, England.
Supervisors: Prof. James H. Davenport and Prof. Theresa Smith.

Publications

Peer-Reviewed Conferences

2024 *Sayan Biswas*, Anne-Marie Kermarrec, Rishi Sharma, Thibaud Trinca, and Martijn de Vos: "***Fair Decentralized Learning***". Proceedings of the 3rd IEEE Conference on Secure and Trustworthy Machine Learning (SaTML) 2025 (*to appear*).

2024 *Sayan Biswas*, Mathieu Even, Anne-Marie Kermarrec, Laurent Massoulie, Rafael Pires, Rishi Sharma, and Martijn de Vos: "***Noiseless Privacy-Preserving Decentralized Learning***". Proceedings of the 25th Privacy Enhancing Technologies Symposium (PoPETs) 2025, Issue 1, pp 824–844. DOI: 10.56553/popets-2025-0043.

2023 *Sayan Biswas*, Kangsoo Jung, and Catuscia Palamidessi: "***Tight Differential Privacy Guarantees for the Shuffle Model with k-Randomized Response***". Proceedings of the 16th International Symposium on Foundations and Practice of Security (FPS) 2023, pp 440–458, LNCS 14551, Springer. DOI: 10.1007/978-3-031-57537-2_27.

2023 *Sayan Biswas* and Catuscia Palamidessi: "***PRIVIC: A privacy-preserving method for incremental collection of location data***". Proceedings of the 24th Privacy Enhancing Technologies Symposium (PoPETs) 2024, Issue 1, pp 582–596. DOI: 10.56553/popets-2024-0033.

2023 Filippo Galli, *Sayan Biswas*, Kangsoo Jung, Tommaso Cucinotta, and Catuscia Palamidessi: "***Group privacy for Personalized Federated Learning***". Proceedings of the 9th International Conference on Information Systems Security and Privacy (ICISSP) 2023, pp 252-263, SciTePress Digital Library. DOI: 10.5220/0011885000003405.

2022 *Sayan Biswas*, Graham Cormode, and Carsten Maple: "***Impact of Sampling on Locally Differentially Private Data Collection***". Proceedings of Competitive Advantage in the Digital Economy – Resilience, Sustainability, Responsibility, and Identity (CADE) 2022, pp 64-70, IET Digital Library and IEEE Xplore. Winner of the **Best Paper Award**. DOI: 10.1049/icp.2022.2042.

2022 *Sayan Biswas*, Kangsoo Jung, and Catuscia Palamidessi: "***Tight Differential Privacy Blanket for Shuffle Model***". Proceedings of Competitive Advantage in the Digital Economy – Resilience, Sustainability, Responsibility, and Identity (CADE) 2022, pp 61-63, IET Digital Library and IEEE Xplore. DOI: 10.1049/icp.2022.2041.

2021 *Sayan Biswas*, Kangsoo Jung, and Catuscia Palamidessi: "***An Incentive Mechanism for Trading Personal Data in Data Markets***". Proceedings of the 18th International Colloquium on Theoretical Aspects of Computing (ICTAC) 2021, pp 197-213, LNCS 12819, Springer. DOI: 10.1007/978-3-030-85315-0_12.

Journals

2024 Ugur Ilker Atmaca, *Sayan Biswas*, Carsten Maple, and Catuscia Palamidessi: "***A Privacy-Preserving Querying Mechanism with High Utility for Electric Vehicles***". IEEE Open Journal of Vehicular Technology, Volume 5, pp 262-277. DOI: 10.1109/OJVT.2024.3360302.

2023 Filippo Galli, Kangsoo Jung, *Sayan Biswas*, Catuscia Palamidessi, and Tommaso Cucinotta: "***Advancing Personalized Federated Learning: Group Privacy, Fairness, and Beyond***". Springer Nature Computer Science, Volume 4, Issue 6, Article 831 (2023). DOI: 10.1007/s42979-023-02292-0.

Book Sections

2021 Kangsoo Jung, *Sayan Biswas*, and Catuscia Palamidessi: "***Establishing the Price of Privacy in Federated Data Trading***". Protocols, Strands, and Logic, pp 232-250, LNCS 13066, Springer. DOI: 10.1007/978-3-030-91631-2_13.

Non-Archival Workshops

2024 *Sayan Biswas*, Mark Dras, Pedro Faustini, Natasha Fernandes, Annabelle McIver, Catuscia Palamidessi, and Parastoo Sadeghi: "***Bayes' capacity as a measure for reconstruction attacks in federated learning***". Workshop on Security, Privacy, and Information Theory (Protect-IT) in conjunction with IEEE Computer Security Foundations Symposium (CSF) 2024. July 8, 2024; Enschede, The Netherlands.

2023 *Sayan Biswas* and Catuscia Palamidessi: "***PRIVIC: A privacy-preserving method for incremental collection of location data***". Theory and Practice of Differential Privacy Workshop (TPDP) 2023. September 27-28, 2023; Boston, USA.

2023 Filippo Galli, *Sayan Biswas*, Kangsoo Jung, Tommaso Cucinotta, and Catuscia Palamidessi: "***On the adaptive sensitivity of differentially private machine learning***". The 4th Workshop on Privacy-Preserving Artificial Intelligence (PPAI) in conjunction with AAAI 2023. February 13, 2023; Washington DC, USA.

2022 Filippo Galli, *Sayan Biswas*, Kangsoo Jung, Tommaso Cucinotta, and Catuscia Palamidessi: "***Group privacy for personalized federated learning***". International Workshop on Federated Learning: Recent Advances and New Challenges (FL-NeurIPS) in conjunction with NeurIPS 2022. December 2, 2022; New Orleans, USA. One of the **12 amongst the 103 submissions selected for oral presentation**.

Awards and Achievements

2024 **Institut Polytechnique de Paris Award for Best PhD Thesis**

2022 **Winner of the *Best Paper Award* at the Competitive Advantage in the Digital Economy – Resilience, Sustainability, Responsibility, and Identity (CADE) 2022** held in Venice, Italy

2018 **Qualified for the International Collegiate Programming Contest (ICPC) European Finals 2018** *(first solver of Problem 5 in the UK and Ireland qualification round)* held at TU Eindhoven, The Netherlands, representing University of Bath

2016 **Received an *Honourable Mention* in the final round of Indian National Philosophy Olympiad 2016** *(top 10 from India)*

2016 **Qualified the Zonal Informatics Olympiad, 2016** *(top 6 in West Bengal, India)*, organised by the Indian Association for Research in Computing Science

2015 **Received an *Honourable Mention* at the International Linguistics Olympiad (IOL) Training Camp 2015** *(top 15 in India)* held at Microsoft Research Lab in Bangalore, India (the invitational round to be selected in the Indian team for IOL 2015)

2013 & 2014 **Qualified the Regional Mathematical Olympiad 2013 & 2014** *(top 28 in West Bengal, India)*, organised by the National Board of Higher Mathematics and Homi Bhaba Centre for Science and Education

Miscellaneous Research Appointments

Sep'23 - Oct'23 **Visiting Scholar**, *Macquarie University*, Sydney, Australia,
Supervisors: Prof. Annabelle McIver and Dr. Natasha Fernandes.

Jan'22 - Mar'22 **Visiting Scholar**, *The University of Warwick*, Coventry, England,
Supervisors: Prof. Carsten Maple and Prof. Graham Cormode.

Jun'20 - Aug'20 **Research Intern**, *The University of Warwick*, Coventry, England,
Supervisors: Prof. Graham Cormode and Prof. Carsten Maple.

Jun'19 - Sep'19 **Research Intern**, *INRIA*, Palaiseau, France,
Supervisor: Prof. Catuscia Palamidessi.

Jun'18 - Aug'18 **Research Intern**, *Institute for Mathematical Innovation (IMI) and University of Bath*, Bath, England,
Supervisor: Prof. Christopher Jennison.

Teaching

Aug'22 - Sep'22 **INRIA-DFKI European Summer School on AI (IDESSAI 2022)**, *Saarbrücken, Germany*,
Differential Privacy & Federated Learning: theory and implementation (voted as the *most liked course* of IDESSAI 2022).

Feb'21 - Jun'23 **École Polytechnique**, *Palaiseau, France*,
CSE 102: Advanced Programming with Python.

Oct'18 - May'20 **University of Bath**, *Bath, England*,
XX10190: Programming & Discrete Mathematics with MATLAB (2018-19), MA10209: Algebra 1A (2019-20), and MA10212: Prob. & Stat. 1B (2019-20) .

Jul'17 - Aug'17 **Humen Foreign Language School (HFLS)**, *Humen, China*,
Taught Mathematics and English at the HFLS International Summer Camp.

Supervision

Spring Semester 2023-24 **Thibaud Trinca** (Master thesis; co-supervised with Martijn de Vos and Rishi Sharma). Thesis title: Enhancing Fairness in Decentralized Learning with Clustering-based Personalization of Models.
Lubor Budaj (Master thesis; co-supervised with Martijn de Vos and Rishi Sharma). Thesis title: A Comparative Evaluation of Decentralized Learning Algorithms using Realistic Real-world Traces.

Academic Services

2024 Member of the Programme Committee – *IEEE Conference on Secure and Trustworthy Machine Learning (SaTML) 2025*

2023 - present Peer Reviewer – *IEEE Journal on Selected Areas in Information Theory*

2021 - present Peer Reviewer – *IEEE Transactions on Dependable and Secure Computing*

2022 Member of the Programme Committee – *AAAI Workshop Privacy Preserving Artificial Intelligence (PPAI) 2023*

Other Work Experience

Nov'18 - May'20 Lead student-editor of Dept. of Mathematics newsletter of University of Bath

Jul'19 Invigilator and examiner for the International Mathematical Olympiad (IMO) 2019 at Bath, UK

Feb'17 - Nov'19 Project coordinator and head for Mathscon (UK's largest student-led maths conference)

Jan'17 - Mar'20 Volunteer for United Kingdom Mathematics Trust and Mentor for British Mathematical Olympiad