

Sayan Biswas

Research interests

Decentralized Machine Learning and Federated Learning focusing on Privacy, Fairness, and Personalization; Secure and Trustworthy Distributed Systems; Differential Privacy; 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

- 2025 Sayan Biswas, Davide Frey, Romaric Gaudel, Anne-Marie Kermarrec, Dimitri Lerévérend, Rafael Pires, Rishi Sharma, François Taïani: “**Low-Cost Privacy-Aware Decentralized Learning**”. Proceedings on Privacy Enhancing Technologies Symposium (PoPETs) 2025 (to appear).
- 2025 Sayan Biswas, Anne-Marie Kermarrec, Alexis Marouani, Rafael Pires, Rishi Sharma, Martijn de Vos: “**Boosting Asynchronous Decentralized Learning with Model Fragmentation**”. Proceedings of the ACM Web Conference (TheWebConf/WWW) 2025 (to appear). **Selected for oral presentation.**
- 2024 Sayan Biswas, Anne-Marie Kermarrec, Rishi Sharma, Thibaud Trinca, Martijn de Vos: “**Fair Decentralized Learning**”. Proceedings of the IEEE Conference on Secure and Trustworthy Machine Learning (SaTML) 2025 (to appear).
- 2024 Sayan Biswas, Mathieu Even, Anne-Marie Kermarrec, Laurent Massoulié, Rafael Pires, Rishi Sharma, Martijn de Vos: “**Noiseless Privacy-Preserving Decentralized Learning**”. Proceedings on Privacy Enhancing Technologies Symposium (PoPETs) 2025, Issue 1, pp 824–844. DOI: 10.56553/popets-2025-0043.
- 2023 Sayan Biswas, Kangsoo Jung, Catuscia Palamidessi: “**Tight Differential Privacy Guarantees for the Shuffle Model with k -Randomized Response**”. Proceedings of the 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, Catuscia Palamidessi: “**PRIVIC: A privacy-preserving method for incremental collection of location data**”. Proceedings of the 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, Catuscia Palamidessi: “**Group privacy for Personalized Federated Learning**”. Proceedings of the 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, 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, 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, Catuscia Palamidessi: “**An Incentive Mechanism for Trading Personal Data in Data Markets**”. Proceedings of the 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, 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, 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, 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, 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, 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, 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, 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 Bhabha 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.

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