

# Sayan Biswas

## Research interests

Decentralized Learning; Federated Learning; Ethical Machine Learning 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

- 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. Published: April 25, 2024. 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 on Privacy Enhancing Technologies (PoPETs), Volume 2024, Issue 1, pp 582–596. Published: October, 2023. 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. Published: February 24, 2023. 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. Published: November 9, 2022. 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. Published: November 9, 2022. 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. Published: August 20, 2021. 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. Published: January 30, 2024. 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). Published: October 28, 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. Published: November 19, 2021. 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

- 2022 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  
- 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

- 2023 - present Peer Reviewer – *IEEE Journal on Selected Areas in Information Theory*
- 2021 - present Peer Reviewer – *IEEE Transactions on Dependable and Secure Computing*
- 2022 - 2023 Member of the Programme Committee – *AAAI Workshop Privacy Preserving Artificial Intelligence (PPAI) 2023*

## Select Talks

- 2022 “**Incremental collection of location data: Differential Privacy and beyond...**”. 7th Franco-Japanese Cybersecurity Workshop 2022. Presentation: 24th October 2022 in Tokyo, Japan.
- 2022 “**Three-way optimization of privacy and utility of location data**”. 12th Atelier sur la Protection de la Vie Privée (APVP) 2022. Presentation: 14th March 2022 in Chatenay-sur-Seine, France.

## 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