

Sayan Biswas

Research interests

Differential Privacy, Federated Learning, Decentralised Learning, Privacy-Preserving Machine Learning, Location Privacy.

Positions

2023 - present **Postdoctoral Researcher**, EPFL (SaCS Lab), Lausanne, Switzerland.

Education

- 2020 - 2023 **PhD in Computer Science**, INRIA and École Polytechnique (Institut Polytechnique de Paris), Palaiseau, France.
Thesis: "Understanding and optimizing the trade-off between privacy and utility from a foundational perspective"
Supervisor: Catuscia Palamidessi
- 2016 - 2020 **Master of Mathematics (M.Math.)**, First-class honours, University of Bath, Bath, England.
Specialisation: Probability Theory, Statistics, Data Analysis
M.Math project: *Quantifying Identifiability*. Supervisors: James H. Davenport and 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 (to appear).
- 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. ISBN: 978-989-758-624-8, 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**. ISBN: 978-1-83953-742-4, 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. ISBN: 978-1-83953-742-4, 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. ISBN: 978-3-030-85315-0, DOI: 10.1007/978-3-030-85315-0_12.

Journals

- 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. ISBN: 978-3-030-91631-2, DOI: 10.1007/978-3-030-91631-2_13.

Key Acceptances at Non-Archival Workshops

- 2023 Sayan Biswas and Catuscia Palamidessi: "**PRIVIC: A privacy-preserving method for incremental collection of location data**". Theory and Practice of Differential Privacy (TPDP) Workshop 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 in Conjunction with AAAI (PPAI) 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 in Conjunction with NeurIPS (FL-NeurIPS) 2022. December 2, 2022; New Orleans, USA. One of the **12 amongst the 103 submissions selected for oral presentation**.

Miscellaneous Research Appointments

- Sep'23 - Oct'23 **Visiting Scholar**, *Macquarie University*, Sydney, Australia.
Supervisors: Annabelle McIver and Natasha Fernandes
- Jan'22 - Mar'22 **Visiting Scholar**, *The University of Warwick*, Coventry, England.
Supervisors: Carsten Maple and Graham Cormode
- Jun'20 - Aug'20 **Research Intern**, *The University of Warwick*, Coventry, England.
Supervisors: Graham Cormode and Carsten Maple
- Jun'19 - Sep'19 **Research Intern**, *INRIA*, Palaiseau, France.
Supervisor: Catuscia Palamidessi
- Jun'18 - Aug'18 **Research Intern**, *Institute for Mathematical Innovation (IMI) and University of Bath*, Bath, England.
Supervisor: Christopher Jennison

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.

Teaching

- Aug'22 - Sep'22 **INRIA-DFKI European Summer School on AI (IDESSAI 2022)**, *Saarbrücken, Germany*.
- Delivered a hands-on session to implement *differential privacy with federated learning in Python*
- Got a *special mention* as the *most liked course* of the summer school
- Feb'21 - Jun'23 **École Polytechnique**, *Palaiseau, France*.
Teaching Assistant
- CSE 102: Advanced Programming with Python
- Oct'18 - May'20 **University of Bath**, *Bath, England*.
Teaching Assistant
- 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**, *Humen, China*.
Foreign Exchange Teacher
- Taught Mathematics and English at the 2017 International Summer Camp organised by HFLS

Academic Services

- 2021 - present Peer Reviewer – *IEEE Transactions on Dependable and Secure Computing*
- 2022-23 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**, *University of Bath*.
- Feb'17 - Nov'19 **Coordinator of Mathscon**, *Project head of UK's largest student-led maths conference*.
- Jan'17 - Mar'20 **Mentor for British Mathematical Olympiad**, *United Kingdom Mathematics Trust*.

Awards and Achievements

- 1 **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 (2022)
- 2 **Qualified the UK and Ireland Programming Contest (UKIEPC)** (was the **first solver of Problem 5 in the UK and Ireland**) for the North-West European Regional Contest (NWERC) of *International Collegiate Programming Contest (ICPC) European Finals* in Eindhoven University of Technology, Netherlands, representing University of Bath (2018)
- 3 **Qualified the Regional Mathematical Olympiad** (*top 28 in West Bengal, India*), organised by the National Board of Higher Mathematics and Homi Bhabha Centre for Science and Education (2013 & 2014)
- 4 **Qualified the national stage of Panini Linguistics Olympiad** (*top 15 in India*); attended the International Linguistics Olympiad Training Camp and invitational round at Microsoft Research Lab, India; received *Honourable Mention* (2015)
- 5 **Qualified the final round of Indian National Philosophy Olympiad** (*top 10 from India*); received *Honorable Mention* in the International Philosophy Olympiad Training Camp (2016)
- 6 **Qualified the Zonal Informatics Olympiad** (*top 6 in Kolkata, India*), organised by the Indian Association for Research in Computing Science (2016)