# Sayan Biswas

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Personal Homepage

## Research interests

Differential Privacy, Federated Learning, Location Privacy, Privacy-Utility Optimization

## 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.
Supervisor: Catuscia Palamidessi
Thesis: *Understanding and optimizing the trade-off between privacy and utility from a foundational perspective*

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* 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. 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, 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, 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, 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, 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***". Special issue of Springer Nature Computer Science: Recent Trends on Information Systems Security and Privacy *(to appear)*.

### 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, 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

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

## Select Talks

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| 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

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| Aug'22 - Sep'22 | **INRIA-DFKI European Summer School on AI (IDESSAI 2022)**, *Saarbrücken, Germany*.<br>- Delivered a hands-on session to implement *differential privacy* with *federated learning* in *Python*<br>- Got a *special mention* as the *most liked course* of the summer school |
| Feb'21 - Jun'23 | **École Polytechnique**, *Palaiseau, France*.<br>Teaching Assistant<br>- CSE 102: Advanced Programming with Python |
| Oct'18 - May'20 | **University of Bath**, *Bath, England*.<br>Teaching Assistant<br>- XX10190 Programming & Discrete Mathematics (with MATLAB) – 2018-19<br>- MA10209 Algebra 1A – 2019-20<br>- MA10212 Prob. & Stat. 1B – 2019-20 |
| Jul'17 - Aug'17 | **Humen Foreign Language School**, *Humen, China*.<br>Foreign Exchange Teacher<br>- Taught Mathematics and English at the 2017 International Summer Camp organised by HFLS |

## Academic Services

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| 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

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| 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 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 Bhaba 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)*