Sayan Biswas

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Personal Homepage

Research interests

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

Positions

2023 - present   **Postdoctoral Researcher**, *EPFL (SaCS Lab)*, Lausanne, Switzerland,
Supervisor: Prof. Anne-Marie Kermarrec.

Education

2020 - 2023   **PhD in Computer Science**, *INRIA and École Polytechnique (Institut Polytechnique de Paris)*, Palaiseau, France,
Supervisor: Prof. Catuscia Palamidessi.

2016 - 2020   **Master of Mathematics (M.Math.), First-class honours**, *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 *(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

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

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**.

Awards and Achievements

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*.
- Implementing *differential privacy* with *federated learning* in *Python*
- Received *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

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