Saurab Chhachhi

POSTGRADUATE RESEARCHER · CONTROL AND POWER GROUP

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Education

Imperial College London   *London, UK*

PhD ELECTRICAL AND ELECTRONIC ENGINEERING   *2019 - 2024*

- Thesis Title: Balancing Privacy and Data Access: An Interdisciplinary Approach for Differentially-Private Smart Meter Data
- Developed privacy-preserving mechanisms for data valuation and procurement using incentive mechanism design theory, machine learning and mathematical optimisation techniques.
- Investigated valuation frameworks for smart meter data from the perspective of the system, suppliers, and consumers.
- Designed and deployed discrete choice experiment to estimate consumer privacy valuations for smart meter data including the quantification of behavioural effects such as information asymmetries and policy framing.

Imperial College London   *London, UK*

MEng ELECTRICAL AND ELECTRONIC ENGINEERING - *First Class Honours*   *2011 - 2015*

- Thesis Title: Data Center Demand Response through Geographical Load Balancing
- Techno-economic study investigating data center participation in distribution grid level demand response programs, through their geographical/locational flexibility, to facilitate increased renewable generation.

Research Employment

Energy Futures Lab, Imperial College London   *London, UK*

RESEARCH ASSISTANT - *Smart Meter Data under Privacy Concerns*   *2020 - 2023*

- Assisted in grant writing to secure funding for nationally representative survey on consumer privacy concerns and production of a policy briefing paper on privacy-preserving techniques for smart meter data.
- Led and managed project including writing interim and final reports, budget management and liaison with external partners.

Holst Centre/imec   *Eindhoven, NL*

INTERN - *Characterisation and Readout for AlGaN based NOx Sensing with Integrated Heating*   *2014*

- Developed a readout and control circuit for novel low-power nitrogen oxide gas sensors for continuous air quality monitoring.
- Presented product to partner institutions which were trialled in Lisbon, PT.

Publications

PUBLISHED

S. Chhachhi, F. Teng, P. Ge, J. Graham, and D. Gunduz, "Balancing privacy and access to smart meter data: An Energy Futures Lab Briefing Paper," Imperial College London, pp. 1–64, May 2022, `doi: 10.25561/96974`.

S. Chhachhi and F. Teng, "Market value of differentially-private smart meter data," in 2021 IEEE Power & Energy Society Innovative Smart Grid Technologies Conference (ISGT), IEEE, Feb. 2021, pp. 1–5, isbn: 978-1-7281-8897-3, `doi: 10.1109/ISGT49243.2021.9372228`.

R. Hledik, P. Bagci, and **S. Chhachhi**, "Two Paths for Advancing Great Britain's Smart Metering Programme," The Brattle Group, Dec. 2018, coi: 20.500.12592/6gcngb

UNDER REVIEW

S. Chhachhi and F. Teng, "A joint energy and differentially-private smart meter data market," arXiv preprint, Dec. 2024, `doi: 10.48550/arXiv.2412.07688`

S. Chhachhi and F. Teng, "Wasserstein markets for differentially-private data," arXiv preprint, Dec. 2024, `doi: 10.48550/arXiv.2412.02609`

S. Chhachhi and F. Teng, "On the 1-Wasserstein distance between location-scale distributions and the effect of differential privacy," arXiv preprint, Apr. 2023, `doi: 10.48550/arXiv.2304.14869`.

S. Chhachhi and F. Teng, "Informed Consent and Willingness-to-Pay/Accept for Smart Meter Data Privacy," Working Paper, Dec. 2024.

Skills

Software Python (inc. NumPy, sci-kit learn, Keras), Gurobi, R, LaTeX, Excel + VBA, MATLAB, STATA

Languages English (Fluent), Dutch (Fluent), Hindi (Fluent)

Techniques Optimisation, Game Theory, Machine Learning, Econometrics, Financial Modelling, Grant Writing

Awards, Fellowships, & Grants

2021	**Strategic Priorities Fund 2021-22**, Research England UKRI	*£10,000*
2019	**Fully-Funded Studentship**, London Interdisciplinary Social Science DTP, ERSC ES/P000703/1:2113082	

Presentations

Invited Talks

May 2024. *Wasserstein Distance Based Market for Differentially-Private Data Trading*. EURO 2024, Copenhagen, DK.

May 2022. *Balancing Privacy and Access to Smart Meter Data*. Energy Futures Lab, London, UK.

Contributed Presentations

S. Chhachhi and F. Teng, "Market value of differentially-private smart meter data," in 2021 IEEE Power & Energy Society Innovative Smart Grid Technologies Conference (ISGT), IEEE, Feb. 2021

Teaching Experience

March 2023	**Digitalisation and Data Privacy in Energy Systems, Msc Sustainable Energy Futures**, Graduate Teaching Assistant/Lecturer	
March 2022	**Digitalisation and Data Privacy in Energy Systems, Msc Sustainable Energy Futures**, Graduate Teaching Assistant	

Employment

The Brattle Group - *Economic Consultancy* *London, UK*

Senior Research Analyst · *2016-2018*

- Analysed regulatory regime in Spain for renewable generation, including valuation of over 100 solar, hydro and wind assets.
- Reviewed the UK's Smart Meter Roll-Out, identifying potential risks and developing strategies to achieve roll-out targets.
- Modelled regulatory changes in district heating and electricity sectors in Lithuania including valuations of biofuel plants.
- Analysed the impact of government intervention on consumer loans in Croatia including the default modelling and projection of macro economic conditions.

Sunchine Ltd. - *Quality Control for Solar PV* *The Hague, NL/ Bangalore, IND*

Research Consultant · *2016-2016*

- Conducted market research on Indian PV sector including tracking of market trends, policy analysis and company profiling.
- Developed, and managed an end-to-end quality assurance package for solar modules for a 4MW PV plant in India.
- Developed discounted cashflow models to investigate the feasibility of rooftop solar in various states across India.

e.quinox - *Social Enterprise for Rural Electrification*   *London, UK/ Kigali, RW*

Vɪᴄᴇ-Cʜᴀɪʀᴘᴇʀsᴏɴ   *2012-2015*

- Managed a team working on evaluating and streamlining existing solutions to reduce costs and improve usability.
- Developed a battery evaluation mechanism through a composite comparison index and automated test-benching platform.
- Liaised with local village authorities and government officials to evaluate the current impact and future expansion.

Professional Development

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S. Chhachhi, "Remote working: implications for the electricity network and emissions," The London Journal of Energy, Winter 2020/Illuminem Voices Jul. 2021

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COWork Summer School, Two week online workshop on computational optimisation techniques. 2020

DTU, Advanced Optimization and Game Theory for Energy Systems (audit). 2021

Imperial Graduate School, Research Computing, Research Publication & Maximising Your Management Skills. 2019-2021

DTU CEE Summer School, Data-Driven Analytics and Optimization for Energy Systems. Cancelled due to Covid-19. 2020

LISS DTP Training Courses, Intro to Qualitative Research and Qualitative Data Analysis. 2019.

AQMEN Workshop Series, Data Wrangling, Predictive Data Analysis, Data Visualisation, London/Edinburgh, 2019

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Reviewer, IEEE Transactions on Power Systems, Sustainable Cities

Member, IEEE, IEEE PES

References

Dr Fei Teng, Director of Education at Energy Futures Lab & Senior Lecturer, 1116, Electrical Engineering, Imperial College London, +44 (0)20 7594 6178, f.teng@imperial.ac.uk