# Sumantrak Mukherjee

Scholar
Website: sumantrak.de

Email: mukherjeesumantrak@gmail.com
Mobile: +49 152 59931742
LinkedIn: Sumantrak

## About

Researcher in machine learning for sequential decision-making under uncertainty and partial feedback, with a focus on warm-starting methods for short-horizon settings. My work develops informative priors and structure-aware exploration strategies to improve sample efficiency, while balancing theoretical guarantees with practical deployment considerations. I am particularly interested in experimental design for personalized healthcare, including N-of-1 trials, and have previously worked on spatiotemporal event modeling.

## Education

- **Birla Institute of Technology and Science** — Pilani, India
  *Bachelor of Engineering in Electronics and Instrumentation* — *06/2019 – 05/2023*
  - **Relevant coursework:** Probability and Statistics, Linear Algebra, Calculus, Deep Learning, Neural Networks and Fuzzy Logic, Control Systems, and Industrial Instrumentation and Control.
  - **Bachelor's thesis:** Scalable Causal Bandits with Adequate Causal Discovery.

## Research Experience

- **Junior Researcher – DFKI (German Research Center for AI)** — Kaiserslautern, Germany
  *Advised by Prof. Dr. Sebastian Vollmer* — *10/2023 – Present*
  - Researching **sequential decision-making** under **uncertainty** and **partial feedback**.
  - Developing **warm-starting methods** using **informative priors** and **structure-aware exploration** for **sample-efficient** decisions.
  - Applying methods to **personalized healthcare**, including **N-of-1 trial design**.
  - Previous research includes spatiotemporal event modeling with point processes.
- **Guest Researcher – Rhineland-Palatinate Technical University (RPTU)** — Kaiserslautern, Germany
  *Supervised by Prof. Dr. Sebastian Vollmer* — *04/2023 – 09/2023*
  - Continued research on **sequential decision-making** under **uncertainty**.
  - Researched **active learning** methods for **relabeling**, **data correction**, and learning from **noisy labellers**.
- **Bachelor's Thesis – DFKI (German Research Center for AI)** — Kaiserslautern, Germany
  *Supervised by Prof. Dr. Sebastian Vollmer and Dr. Mengyan Zhang* — *01/2023 – 05/2023*
  - Worked on **Scalable Causal Bandits with Adequate Causal Discovery**.
  - Integrated **Differential Bayesian Structure Learning** with **reward maximization**.
  - Designed and empirically evaluated a **scalable algorithm** for **linear causal bandits** on **synthetic and benchmark** settings.
- **Research Collaboration – Columbia University** — Remote
  *Supervised by Dr. Zenna Tavares (Columbia University)* — *01/2022 – 08/2022*
  - Implemented models of **rational agents** for **(PO)MDPs** with **human biases** and **bounded rationality**.
  - Created **JuliaProgrammingPuzzles.jl** to **benchmark ParametricInversion.jl**.
- **Julia Summer of Code** — Remote
  *Supervised by Dr. Sebastian Vollmer, Dr. Jiahao Chen, Dr. Moritz Schauer* — *05/2021 – 07/2021*
  - Implemented **fairness in-processing algorithms** and integrated them into the **MLJ interface** as wrapper functions.
  - Experimented with techniques to **stabilize adversarial training** and improve **pairwise fairness**.

## Publications

**Linear-LLM-SCM: Benchmarking LLMs for Coefficient Elicitation in Linear-Gaussian Causal Models**
Yamaoka, K., **Mukherjee, S.**, Gärtner, T., Selby, D. A., Konigorski, S., Hüllermeier, E., Bengs, V., & Vollmer, S. J. (2026).
*arXiv preprint arXiv:2602.10282.*

**Neural Spatiotemporal Point Processes: Trends and Challenges**
**Mukherjee, S.**, Elhamdi, M., Mohler, G., Selby, D. A., Xie, Y., Vollmer, S., & Großmann, G. (2025).
*Transactions on Machine Learning Research (TMLR).*

**Had Enough of Experts? Elicitation and Evaluation of Bayesian Priors from Large Language Models**
Selby, D. A., Spriestersbach, K., Iwashita, Y., Bappert, D., Warrier, A., **Mukherjee, S.**, Asim, M. N., Kise, K., & Vollmer, S. (2025).
*Stat, 14(2), e70054.*

**X-Hacking: The Threat of Misguided AutoML**
Sharma, R., **Mukherjee, S.**, Sipka, A., Hüllermeier, E., Vollmer, S. J., Redyuk, S., & Selby, D. A. (2025).
*Proceedings of the Forty-Second International Conference on Machine Learning (ICML 2025).*

**CLAM: Causal Spatial Disaggregation to Infer Local Effects From Coarse Data**
Großmann, G.*, **Mukherjee, S.***, & Vollmer, S. (2025).
*NeurIPS 2025 Workshop on CausScien: Uncovering Causality in Science.* (*Equal contribution).

**SQUID: A Bayesian Approach for Physics-Informed Event Modeling**
**Mukherjee, S.**, Vollmer, S., & Großmann, G. (2025).
*1st Workshop on Differentiable Systems and Scientific Machine Learning @ NeurIPS 2025.*

**Co-Exploration and Co-Exploitation via Shared Structure in Multi-Task Bandits**
**Mukherjee, S.**, Lebedeva, S., Margraf, V., Hanselle, J., Yamaoka, K., Bengs, V., Bhalwankar, R., Neigel, P., Hüllermeier, E., & Vollmer, S. J. (2025).
*Preprint.*

**When Counterfactual Reasoning Fails: Chaos and Real-World Complexity**
Aalaila, Y., Großmann, G., **Mukherjee, S.**, Wahl, J., & Vollmer, S. (2025).
*Nature Scientific Reports (submitted).*

**HawkesNest: A Multi-Axis Benchmark for Spatio-Temporal Pattern Complexity**
Aalaila, Y., **Mukherjee, S.**, Großmann, G., & Vollmer, S. (2025).
*Preprint.*

**Peculiarities of Counterfactual Point Process Generation**
Großmann, G., **Mukherjee, S.**, & Vollmer, S. (2024).
*Proceedings of the 1st ACM SIGSPATIAL International Workshop on Spatiotemporal Causal Analysis (STCausal), 11–22.*

**Graph Agnostic Causal Bayesian Optimisation**
**Mukherjee, S.***, Zhang, M.*, Flaxman, S., & Vollmer, S. (2024).
*NeurIPS BDU Workshop 2024.* (*Equal contribution).

**Had Enough of Experts? Elicitation and Evaluation of Bayesian Priors from Large Language Models**
Selby, D. A., Spriestersbach, K., Iwashita, Y., Bappert, D., Warrier, A., **Mukherjee, S.**, Asim, M. N., Kise, K., & Vollmer, S. (2024).
*NeurIPS BDU Workshop 2024.*

**Flexible Group Fairness Metrics for Survival Analysis**
Sonabend, R., Pfisterer, F., Mishler, A., Schauer, M., Burk, L., **Mukherjee, S.**, & Vollmer, S. (2022).
*DSHealth Workshop on Applied Data Science for Healthcare at KDD 2022.*

## Honors and Awards

- Awarded the **RPTU Research Stipend** (**€5,400**; 04/2023 – 09/2023)
- Selected for **Julia Summer of Code 2021** and awarded **$1,200** for project **Fairness.jl**.
- Awarded **$500** in project funding for **Representation Learning in NLE** from CSS@ICLR 2022.
- Won **Hult Prize India, 2021** and represented India at the Castle Accelerator.

## Teaching

- **Guest Lecturer – Collaborative Intelligence** — RPTU, Kaiserslautern, Germany
  *Advised by Prof. Dr. Sebastian Vollmer* — *01/2024 – 05/2024*
  - Delivered lectures on **Human-in-the-Loop** systems and **Active Learning**.
  - Designed coursework and mentored student projects.
- **Head Teaching Assistant – Neural Networks and Fuzzy Logic** — BITS Pilani, India
  *Supervised by Prof. Dr. Surekha Bhanot* — *08/2022 – 12/2022*
  - Led a team of 12 TAs and coordinated labs and grading.
  - Designed assignments and supported lectures and final project evaluations.
- **Teaching Assistant – Neural Networks and Fuzzy Logic** — BITS Pilani, India
  *Supervised by Prof. Dr. Surekha Bhanot* — *01/2022 – 05/2022*
  - Prepared and evaluated assignments for 120 students.
  - Delivered practical workshops and guided 3 final project teams.

## Co-Curricular and Volunteering

- **Academic Service**: Reviewer for AAAI 2025 and the GIScience 2025 Workshop STCausal. (2025)
- **Co-Organizer (STAR: Space-Time Causality Reading Group)**: Founded and co-organized a cross-institutional reading group on advances in spatiotemporal causality; hosted sessions and presented twice. (03/2025 – Present)
- **Co-Organizer (DSARex, DFKI)**: Initiated and organized sessions for the DSA Research Exchange Group; delivered a session on **active learning methods**. (01/2024 – Present)
- **Chair (BITS ACM)**: Led the Executive Committee, initiated 4 major projects (cybersecurity, blockchain, ML, development), and delivered a lecture on **Causality and Diffusion Processes**. (08/2022 – 07/2023)
- **Special Interest Group Coordinator (BITS ACM)**: Organized hackathons on **Reinforcement Learning**, managed events on CS topics, and led recruitment and onboarding of junior members. (07/2021 – 07/2022)
- **Machine Learning SIG Coordinator (BITS ACM)**: Conducted a lecture series on **Reinforcement Learning**, guided projects on **Computer Vision** and **NLP**, and designed recruitment tasks. (08/2020 – 07/2021)