SOMJIT ROY

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EDUCATION

Texas A&M University, College Station, Texas, USA — 2023 — present
Doctor of Philosophy (Ph.D.) in Statistics — GPA: 4.00/4.00
Advised by **Bani K. Mallick** (TAMU Statistics) and **Debdeep Pati** (UW Madison Statistics).

University of Calcutta, Kolkata, West Bengal, India — 2021 — 2023
Master of Science (MSc.) in Statistics (*Ranked First Class First*) — GPA: 8.15/10.00

St. Xavier's College, Kolkata, West Bengal, India — 2018 — 2021
Bachelor of Science (BSc.) in Statistics (Hons.) — GPA: 8.63/10.00

EXPERIENCE

Los Alamos National Laboratory — May 2025 — Aug 2025
Graduate Summer Intern — Los Alamos, NM, USA

- **SPINWAVEDD: Scalable Physics-Informed Neural Operator for Seismic WAVE Modeling using Domain Decomposition**.
- Advised by **Kai Gao** & **Ting Chen** in *Earth and Environmental Sciences* (EES-16) division. Developing scalable framework for seismic wave modeling using Physics-Informed Neural Operators (PINO).

Tata Electronics Pvt. Ltd. — May 2021 — Aug 2021
Data Science Intern — Bengaluru, KA, India

- **Statistical Analysis and Optimization of Sandblasting & Anodizing**.
- Supervised by **Nagasubramanian Kothandaraman** (Tata Electronics Pvt. Ltd.) & **Subhamoy Maitra** (ISI, Kolkata). Identified key features affecting material properties (gloss and texture) and optimized process parameters using local minimization, machine learning models, and variability analysis. Successfully reduced costs by 2 mandays.

PAST RESEARCH POSITIONS & PROJECTS

University of Maryland, College Park — Sep 2022 — May 2023
Research Fellow — College Park, MD, USA

- **Addressing Nonresponse in Surveys through Imputation & An Application to Social Sciences**.
- Supervised by **Partha Lahiri** in *Department of Mathematics*. This work resulted into my master's dissertation. Nonresponses in primary household survey data were augmented by a general class of imputation technique viz., Nearest Neighbor Hot Deck Imputation (NNHDI), with an application to multidimensional poverty.

Indian Institute of Science, Education & Research, Kolkata — Jun 2022 — Aug 2022
IASc-INSA-NASI Summer Research Fellow — Kolkata, WB, India

- **On Nonparametric Statistics**.
- Supervised by **Anirvan Chakraborty** in *Department of Mathematics and Statistics*. Studied different techniques in nonparametric inference and estimation: estimating statistical functionals, density estimation, curve estimation, and normal means (minimax theory), jackknife, d-deleted jackknife, and bootstrap.

Indian Statistical Institute, Kolkata — Oct 2021 - May 2022
Research Intern — Kolkata, WB, India

- Supervised by **Dr. Subhamoy Maitra** in *Applied Statistics Unit* (ASU).

- **A Heuristic Framework to Search for Approximate Mutually Unbiased Bases**: A heuristic framework was developed to obtain optimal number of Mutually Unbiased Bases (MUBs) through the construction of Approximate MUBs (AMUBs) in dimensions $d = 6, 10, 46$ from $d' = 7, 11$ and 47 respectively. ⧉**
- **Almost Perfect Mutually Unbiased Bases that are Sparse**: As an extension to ⧉**, we propose the concept of Almost Perfect MUBS (APMUBs) to circumvent restrictions in construction of real MUBs, where our techniques are based on combinatorial structures. ⧉

RESEARCH & PUBLICATIONS

My research spans scientific machine learning, Bayes modeling & (approximate) Bayes theory for real-world scientific problems, optimization, and combinatorial designs/structures.

7. **Roy, S.**, Gao, K., & Chen, T. (2025). ***SPINWAVE**: **S**calable **P**hysics-**I**nformed **N**eural Operator for Seismic **WAVE** Modeling.* (In preparation).
6. **Roy, S.**, Dey, P., Mallick, B. K., Pati, D., & Arróyave, R. (2025). *Multi-Property Materials Discovery using multivariate HierBOSSS.* (In preparation).
5. **Roy, S.**, Jaiswal P., Bhattacharya, A., Pati, D., & Mallick, B. K. (2025). *Frequentist Regret Analysis of Fractional Gaussian Process Thompson Sampling.* (In preparation).
4. **Roy, S.**, Dey, P., Mallick, B. K., & Pati, D. (2025). ***Hier**archical **B**ayesian **O**perator-induced **S**ymbolic Regression Trees for **S**tructural Learning of **S**cientific Expressions.* (**HierBOSSS**; submitted).
3. **Roy, S.**, Dey, P., Pati, D., & Mallick, B. K. (2025). *A Generalized Tangent Approximation Framework for Strongly Super-Gaussian Likelihoods.* arXiv:2504.05431 ⧉.
2. Kumar, A., Maitra, S., & **Roy, S.** (2024). *Almost Perfect Mutually Unbiased Bases that are Sparse.* Journal of Statistical Theory and Practice ⧉.
1. Chaudhury, S., Kumar, A., Maitra, S., **Roy, S.**, & Sen Gupta, S. (2022). *A Heuristic Framework to Search for Approximate Mutually Unbiased Bases.* In Cyber Security, Cryptology, and Machine Learning. (CSCML) 2022. Lecture Notes in Computer Science, Springer, Cham ⧉.

CONTRIBUTION TO SOFTWARE

R Packages on CRAN: `bayesestdft` (**Roy, S.** & Lee, S. Y., 2025), `GoodFitSBM` (Ghosh, S., **Roy, S.**, & Pati, D., 2024), `gamblers.ruin.gameplay` (**Roy, S.**, 2022), `YatesAlgo.FactorialExp.SR` (**Roy, S.**, 2021, Selected for a talk in the useR regional conference in Basel, Switzerland, July 2023).

SKILLS

- **Programming Languages & Technical Skills**: JAVA, C, C++, LaTeX, Markdown, Git, & MS Platforms.
- **Statistical Software**: R (RStudio, RStan, RShiny) & Python (PyTorch, Sklearn, Pandas, Numpy, OpenCV).

AWARDS & FELLOWSHIPS

- **NSF Travel Grant** & **TAMU Statistics Department Student Travel Award** (for IISA 2024). ⧉
- Awarded **Targeted Proposal Teams (TPT)** grant & scholarship by Texas A&M University. ⧉
- Selected to attend **CMS^3-FAST Summer School (2024)** in Texas A&M University. ⧉
- Awarded the **R.C. Bose Memorial Book Prize (2022)** by Calcutta Statistical Association. ⧉
- Awarded the **IASc-INSA-NASI Science Academies Summer Research Fellowship (2022)**. ⧉
- Recipient of the **OPHI, University of Oxford - Summer School Grant (2022)**. ⧉
- Awarded the **IAOS 2022 Conference and Travel Grant (2022)** by the World Bank. ⧉

TALKS

- **IISA 2024**: On *Tangent Approximation for Variational Inference in different Exponential Families*. (Kochi, KL, India).

LEADERSHIP & EXTRA-CURRICULAR ACTIVITIES

- **Workflow Workshop Organizer (2024—2025)**, as a part of Statistics Graduate Student Association (SGSA) - TAMU.
- **Organizing Committee Member (2019—2020)**, as a part of the annual fest ϵpsilon δelta organized by Department of Statistics, SXC Kolkata.