Aniruddha Saha

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Software developer and Quantitative researcher merging computational science and mathematical modeling to develop novel algorithmic solutions.

EDUCATION

Cornell University
Ithaca, NY | Aug 2021 - Feb 2026

Ph.D. and Masters in Mechanical Engineering (Minor in Computational Sciences); ***GPA: 3.97/4.0***

- **Relevant Courses:** Financial Engineering, Stochastic Processes, Mathematical Programming, Causal Machine Learning, Strategic Management of Technology and Innovation, Risk Simulation & Monte Carlo Methods, Financial Markets.
- **Other activities:** 2nd place in Sesquehanna International Group brain teaser battle (2024); Cornell Digital Hackathon (2023)
- **Publications:** 5 research papers and 4 conference papers available at : https://aniruddha-saha.github.io/profile/

Indian Institute of Technology (IIT)
Kharagpur, India | Aug 2017 - May 2021

Bachelor of Technology (Honours), Mechanical Engineering; ***GPA: 4.0*** *(Top department rank holder)*

- **Relevant Courses:** Linear Algebra, Probability and Statistics, Perturbation Analysis, Programming and Data Structures.
- **International Fellowships:** Princeton University (2020) | TU Darmstadt, Germany (2020) | Univ. of Tokyo, Japan (2020)
- **Publications:** 3 research papers available at : https://aniruddha-saha.github.io/profile/
- **Science Olympiad:** Top 500 in 100K+ aspirants in National Science Olympiad (Dept. of Science, Govt of India) (2017)

SKILLS

- **Tools:** Python [Algorithms, Data visualization, Machine learning (scikit-learn, Hugging Face Transformers)], R, C++, MATLAB, CUDA, High Performance Computing, LLM fine tuning.

PROFESSIONAL EXPERIENCE

Architected Thermofuilds Lab, Cornell University | Doctoral Candidate
Ithaca, NY | Oct 2021 - Present

- Led computational and numerical modeling efforts to develop in-house multi-physics solver [5 publications]
  - Developed the first hybrid C++/python based multiphysics solver to model spatial geometry variation for combustion.
  - Predicted novel toplogies using minimal area lattices that supersede current state-of-the art combustion efficiency ~40% .
  - Created numerical methods that enable 6X improvement in accuracy/cost efficiency of computational physics solvers.
  - Derived new mathematical models to solve linear damped systems using 4th order Runge-Kutta method to model flows.
  - Developed a stochastic optimizer for maximizing flow using sinusoidal surfaces that surpass the state-of-the art by 5X.

ANSYS | Software Engineering Intern
Austin, TX | May 2024 - Aug 2024

- Engineered a novel algorithm to decode thermal properties from grayscale circuit layouts to improve speed by 3X.
- Designed spatial points maps using computational geometry to detect boundary from >1M data points.
- Developed the frontend and backend using PySide6 creating a software module for circuit file processing <1 minute.

NASA Ames Research Center | Software Development Intern
Mountain View, CA | Jun 2023 - Aug 2023

- Collaborated with computational teams to develop filtering algorithms for PuMA (NASA multiphysics software) .
- Created Monte-Carlo methods to evaluate complex integrals in 3D space with sparse data that is 100X faster than before.
- Identified periodicity in filtered data by statistically analyzing certain kernel functions leading to better choice of kernels.

Heat Inverse | Software Development Intern
Ithaca, NY | Jul 2022 - Dec 2022

- Developed quantitative models to describe cooling performance using electromagnetic theory and geometric analysis.
- Leveraged Python's Lowtran and Macromax libraries to simulate and analyze electromagnetic radiation through films.

Indian Institute of Science | Computational Modeling Researcher
Bengaluru, India | May 2019 - Jul 2021

- Derived and published the first work on mathematical model of coalescence in fluids having stress tensors with memory.
- Developed high performance computing codes to study matter in atomic scales by modeling force fields [3 publications].

PROJECTS & OTHER EXPERIENCE

Finance:

- Optimized return-to-risk ratios using Markowitz theory in R to achieve optimal asset allocation across 10+ stocks.
- Conducted time-series forecasting and of stock prices using AR, MA, ARIMA and XGBoost models using historical data.
- Simulated stochastic crop price dynamics using Monte Carlo methods, incorporating drift and volatility parameters.

Machine Learning:

- Fine-tuned the Mistral-7B-Instruct model using QLoRA, enabling high-quality, context-aware responses to YouTube comments.
- Experience with C++ program with Nvidia CUDA to leverage GPUs for high-performance computing.
- Implemented vector similarity search for time-series climate data using Pinecone, enabling efficient retrieval and prediction.