Surbhit Wagle

Research Engineer

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UK Global Talent Visa (no sponsorship required)

Professional Summary

Research-focused software engineer with a PhD in computational modelling and over six years of experience developing machine-learning models, experimental workflows, optimisation pipelines, and reusable scientific software. Experienced in designing reproducible computational experiments, statistical and mechanistic modelling, parameter exploration, model validation, and translating mathematical models into tested and maintainable ML systems. Advanced Python expertise with PyTorch, scientific computing, HPC-enabled workflows, automated testing, and performance optimisation. Hands-on experience using LLMs in research-engineering workflows for code generation, codebase understanding, technical documentation, and debugging. Experienced working with interdisciplinary research teams to turn open scientific questions into scalable software and evidence-based analysis.

Core Skills

Research, Evaluation & Experimental Methods: Reproducible experimentation, model evaluation pipelines, model validation, statistical modelling, stochastic processes, parameter optimisation, sensitivity analysis, feature engineering, experimental-data comparison

Machine Learning & AI: unsupervised learning, representation learning, Bayesian inference, time-series modelling, computer-vision, model evaluation pipelines, feature engineering, optimisation, statistical modelling

LLM-Assisted Research Engineering: Code generation, codebase understanding, technical documentation, debugging and issue resolution using large language models within iterative development workflows
Modelling and Simulation: Equation-based modelling, ODE/PDE systems, nonlinear dynamical systems, finite-difference methods, numerical integration, multiscale modelling, mechanistic modelling

Research Software Engineering: Python (advanced), NumPy, SciPy, Pandas, API design, package development, automated testing, debugging, documentation, Git, CI/CD, Docker, Linux

Scalable Computing & Performance: HPC job orchestration, parallel batch workflows, large-scale parameter exploration, performance profiling, algorithmic optimisation, Bash

Additional Programming & Data Tools: C/C++ (working knowledge), C# (working knowledge), SQL, Matplotlib, PyQt/PySide, Tkinter, REST APIs, MySQL, SQLite, MVC architecture, scientific visualisation dashboards, Unity3D

Collaboration & Research Communication: Interdisciplinary collaboration, stakeholder communication, project ownership, mentoring, code reviews, developer documentation

Relevant Work Experience

Postdoctoral Research Associate, Imperial College London, UK June 2025 – present

- Built modular PyTorch experimentation frameworks to support rapid iteration and reproducible machine-learning research, providing durable infrastructure for running and validating experiments.
- Applied LLMs within research-engineering workflows for code generation, codebase understanding, technical documentation, and debugging, using model outputs as part of an iterative development and verification process.
- Translated mathematically grounded models into scalable ML systems, with automated testing and CI/CD to improve reliability, reproducibility, and maintainability.
- Worked closely with clinicians, biologists, and software engineers to turn research requirements into ML software supporting large-scale scientific studies and evidence-based analysis.

PhD Researcher, University Hospital Bonn, Germany Sept 2023 – May 2025

- Designed and implemented equation-based models of spatial mRNA and protein transport using partial differential equations, finite-difference methods, and numerical integration.
- Built large-scale Python experimentation and simulation workflows for parameter exploration, model validation, and comparison with experimental observations, grounding modelling decisions in empirical evidence.
- Developed a scientific image-analysis package combining computer vision, deep learning for time-series data, and graph algorithms, reducing image-processing runtime by approximately 40% through pipeline and algorithm optimisation.
- Published and maintained open-source scientific software with a strong emphasis on testing, documentation, reproducibility, and long-term maintainability, supporting adoption by interdisciplinary researchers.

PhD Researcher, University of Mainz Medical Center, Germany July 2020 – Aug 2023

- Collaborated with experimental and computational researchers to translate open scientific questions into scalable computational experiments and software solutions.
- Developed mechanistic and statistical models of molecular transport and trafficking using differential equations, parameter optimisation, statistical modelling, and data-driven methods.
- Built and maintained clear developer interfaces and documentation to make research software reproducible, reusable, and accessible to other researchers.

Junior Research Assistant, National Center for Biological Sciences/Institute for Stem Cell Science and Regenerative Medicine, India Nov 2018 – May 2020

- Designed API-driven infrastructure for submitting, monitoring, and retrieving parallel batch optimisation experiments on the Neuroscience Gateway HPC platform, enabling large-scale parameter estimation for mechanistic models.
- Built web applications for the storage, curation, and analysis of large experimental datasets using Python, PHP, SQL, and web technologies.
- Developed a recommendation system to identify closely matching machine-learning models and optimised its query pipeline to improve search and retrieval efficiency.
- Optimised large-scale biochemical reaction-network models containing hundreds of reactions and thousands of parameters using hierarchical optimisation methods.
- Collaborated with biologists, chemists, and engineers to build user-facing scientific software supporting both experimental and computational research workflows.

Education

Ph.D. with magna cum laude in Neuroscience (Computational and ML-focused), Rhenish Friedrich Wilhelm University of Bonn, Germany July 2020 – May 2025

M. Tech. in Biological Sciences and Bioengineering, Indian Institute of Technology Kanpur, India July 2016 – Aug 2018

B.E. (with distinction) in Computer Engineering, Institute of Engineering and Technology, Indore, India Sept 2012 – June 2016

Selected Research Projects

PDE Transport Simulation

- Developed reproducible finite-difference simulation workflows for spatial molecular-transport models, including systematic parameter exploration and validation against experimental observations.
- Used computational experiments to assess model behaviour across parameter settings and compare simulated outcomes with empirical data.

HPC Parameter-Estimation Platform

- Built API-driven infrastructure for submitting, monitoring, and retrieving large-scale parallel optimisation experiments on a supercomputing platform.
- Supported parameter estimation for mechanistic models containing hundreds of reactions and thousands of parameters, enabling scalable exploration of complex model behaviour.