Vinayak Arora

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Education

King's College London Expected June 2028

MSci Physics (four-year degree) | 2nd year: 2:1

Dean's Commendation, Associate of King's College (AKC) Programme — 2 semesters, 2025/26.

Experience and Projects

The Ergodic Blindspot 2026

- Simulated 400,000 ten-year paths of a compounding portfolio with a rolling tail-risk put hedge in Python. Showed it cuts the 1-in-1,000 drawdown from 99.96% to 75.5% and raises mean log growth, yet trails on 93% of paths.
- Achieved up to 163× variance reduction by combining importance sampling and control variates. Modelled volatility memory with fractional Gaussian noise, showing standard error bars understate uncertainty by up to 3.5×.

Deterministic Turbulence Generation 2026

- Implemented a 16-shell Sabra model in Wolfram Language to generate intermittent signals through nonlinear dynamics, tracking energy transfer and dissipation.
- Converted simulated signals into return and price series; analysed tail behaviour, autocorrelation and scaling, and exported data and metadata for reproducibility.

Computational Pattern Studies 2026

- Created six visual studies of Lorenz dynamics, Julia fractals, reaction-diffusion, wave interference and electric fields using Wolfram Language.
- Used sampled Lorenz trajectories to parameterise Julia sets and wrote scripts with explicit parameters for reproducible image generation.

The Math Maestro October – December 2022

- Developed an open-source mathematics quiz app in Flutter and Dart, generating randomised questions and answer options across arithmetic, algebra, fractions and geometry.
- Implemented topic selection and lesson navigation, with generated numerical and word problems for repeated practice.

Technical Skills

Programming: Python, Wolfram Language, Dart

Tools and libraries: NumPy, SciPy, pandas, Matplotlib, Mathematica, Flutter

Methods: Monte Carlo simulation, importance sampling, control variates, numerical integration and time-series analysis

Languages

Hindi (first language), Punjabi and English — fluent in reading, writing and speaking all three.