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Hamza Hussain

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Education

University of Oxford – Mathematical Institute & St. Catherine's College — Oxford, England
DPhil in Mathematics (Numerical Analysis) — *Fall 2026 – Present*

New York University, Valedictorian – Tandon School of Engineering & Courant Institute — New York City, NY
B.S. in Applied Mathematics & Physics, Quantum Technology | ***4.0 GPA*** — *Aug 2022 – May 2026*

- **Relevant Coursework**: Honors Numerical Analysis, Linear & Nonlinear Optimization, Math of Quantum Computing, Quantum Mechanics, Quantum Programming, Advanced Linear Algebra, Probability & Stats, Data Structures & Algorithms
- **Honors & Awards**: Dean's Award for Outstanding Scholarship; Applied Physics Academic Excellence Award; George Bachman Award (outstanding undergraduate mathematics major)
- **Study Abroad**: NYUAD – Abu Dhabi (Astroparticle & Computational Physics), VinUniversity – Hanoi (Digital Twin for Smart Cities), Hanyang University – Seoul (UN SDGs & Korean Language)
- **Activities & Societies**: NYU Engineering Honors, Society of Undergraduate Physics, Muslim Student Association (President)

Professional Experience

JasperTech | *New York City & San Francisco* | Co-Founder & CTO — *Mar – Aug 2026*

- Built an AI-native process simulation platform that converts natural-language design prompts into editable flowsheets, then solves them with a native browser engine (sub-100 ms typical latency) or DWSIM-backed rigorous simulation (2–30 s).
- Designed and presented the numerical backend to investors, combining MESH-equation models and Newton-method solving with IDAES/Pyomo/IPOPT optimization and techno-economic analysis.
- Drove early traction to approximately 30 monthly users and 2 paid pilots; the platform later received backing from LvlUp Ventures.

NYU Plasma Physics Group, Courant | *New York City, NY* | Optimization Researcher — *Jan 2025 – Present*

- Designed a Stage-1 Augmented Lagrangian boundary-shape optimizer in Python (Simsopt + VMEC), enforcing constraints via multiplier/penalty updates and optimizing aspect ratio, mean iota, and quasisymmetry residuals.
- Leveraged parallel computing on NYU Greene to run VMEC evaluations and parameter scans with `mpirun` on 48 cores; maintained reproducibility via Git feature-branch workflow.
- Investigated a stochastic robustness pipeline: drew 16 coil/shape perturbation samples and evaluated 256 out-of-sample trials to model manufacturing error, tracking mean-flux objective at the 10^{-6} scale.

Pickle | *New York City, NY* | Data Science & Engineering Intern — *Nov 2024 – May 2025*

- Analyzed user behavior and job liquidity for a healthcare staffing platform using SQL and Pandas to build customer-facing tools and guide product decisions.
- Designed data visualizations and assessed data quality across Hex, Sanity, PostHog, and Supabase; interpreted 20,000+ monthly entries across 5,700+ registered users.
- Developed 4 new dashboards tracking user/job liquidity, salary statistics, and device usage – tripling internal reporting coverage and improving cross-functional data visibility.

UT Southwestern Medical Center | *Dallas, TX* | Modeling Intern — *Jun – Aug 2024*

- Researched cardiovascular function using mathematical modeling techniques in MATLAB.
- Reduced heart volume-tracking runtime from 8 hours to 5 minutes by modernizing PDE solvers with Conda/Docker.

Projects & Publications

- **SCUDEM | SIMIODE International Math Modeling Competition (Nov 2024)**: Modeled the impact of mood and messaging on vaccination behavior using differential equations and data-driven parameters (MATLAB).
- **Quantum Algorithm Applications | NYCHAQ 2nd Place & NYU Tandon Quantum Hackathon (Sep 2023–Sep 2024)**: Applied VQE & QAOA to portfolio optimization, encoding portfolio risk in a Hamiltonian cost function and minimizing its energy; developed a quantum bin-packing approach for supply-chain optimization, minimizing carbon emissions (Python, Qiskit).
- **Computational Physics | NYU Abu Dhabi (Jan – May 2023)**: Applied numerical methods to solve differential equations, build pseudo-random number generators, implement numerical Monte Carlo techniques, use scikit-learn for ML in physics (Python).
- **CMR Phase Detection | Heidelberg University (Jan 2021 – Mar 2022)**: Co-authored "Self-supervised motion descriptor for cardiac phase detection in 4D CMR based on discrete vector field estimations," accepted to the STACOM 2022 workshop at MICCAI (arXiv:2209.05778).

Leadership & Extracurricular

- **Global Leaders and Scholars in STEM (GLASS)**: Awarded $10,000 annually; professional development scholarship at NYU Tandon. Honors thesis on optimization schemes for stellarator fusion aligned with UN SDGs. engineering.nyu.edu/student/hamza-hussain.
- **NYU Designing for Creative Physical Computing**: Built an interactive mural using Arduino-based physical computing for elementary education; presented at the Tandon Research Excellence Exhibit.
- **Drum Corps International, BAC**: Toured/performed nationwide (90+ shows, 150k+ live viewers); taught 1,000+ students.

Skills

Programming: Python (Pandas, NumPy, Matplotlib, scikit-learn), SQL, Quantum Computing (Qiskit)
Tools: Arduino, CAD (SOLIDWORKS), MATLAB, Statistical Data Analysis, LaTeX, Agentic Workflows, AI Coding Tools, Mathematica