GYANATEET DUTTA

Quantum Machine Learning & Scientific Computing Researcher

📧 gyanateet@gmail.com | 📱 +44 7393062320 | 📍 Leeds, UK
LinkedIn | GitHub: Ryukijano | Portfolio

SUMMARY

MSc Artificial Intelligence researcher with award-winning expertise in developing and implementing advanced quantum algorithms for physical simulation and machine learning. Proven ability to architect hybrid quantum-classical workflows from first principles, leveraging extensive experience in high-performance computing (GPU/TPU) and state-of-the-art deep learning frameworks. Seeking to apply this unique skill set to solve challenging problems in materials discovery and fault-tolerant quantum computing.

EDUCATION

Master of Science (MSc) – Computer Science & Artificial Intelligence
University of Leeds, UK | 2023 - 2024
Specialization: Quantum Computing, Machine Learning, Computer Graphics, GPU Computing

Bachelor of Technology (B.Tech) – Electronics & Computer Science
KIIT University, India | 2019 - 2023
Grade: 8.61/10 (First Class with Distinction)

QUANTUM COMPUTING EXPERIENCE

Quantum Algorithm & Application Development

🏆 **1st Place Winner – Yale Quantum Hackathon 2025 ("Quantum Bits")**
Architected and led team in developing a generalized Shor's algorithm for quantum rings, demonstrating a novel approach to factorization for complex structures.

National Quantum Computing Centre (NQCC) UK Hackathon 2025
Selected participant for the Rolls-Royce PLC challenge, focused on modeling hydrogen-surface interactions for aerospace materials using VQE, SQD, and advanced ansatz design (`ffsim`) on IBM Quantum hardware with Q-CTRL error mitigation.

Quantum Algorithm Implementation
Developed robust, from-scratch implementations of core quantum algorithms including Bernstein-Vazirani, Quantum Teleportation, and surface code error correction using the Stim framework.

Quantum Machine Learning Research | *Self-Directed* | 2023 - Present

- Architected and implemented novel Quantum ML models including Variational Autoencoders (QVAE) for MNIST, Quantum Neural Networks (QNNs) for IRIS classification, Quantum Transformers, and Quantum Diffusion Models using Qiskit
- Pioneered a hybrid quantum-classical recurrent architecture, the "Quantum Continuous Thought Machine," with quantum memory slots, successfully applied to classification and reinforcement learning tasks

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PROFESSIONAL EXPERIENCE

Research and Development Scientist
Science Museum Group | *Leeds, UK* | Nov 2023 - Present

- Leads computer vision pipelines for 3D reconstruction of cultural heritage sites, using Structure-from-Motion (SfM) and Neural Radiance Fields (NeRFs)
- Integrates AI models with Unreal Engine for interactive VR environments as part of the HELIX XR collaboration

Research Intern
University of Leeds | *Leeds, UK* | Mar 2025 - Sep 2025

- Develops real-time surgical phase detection models using Vision Transformers and self-supervised learning (DINOv2) for medical video analysis

AWS AI & ML Scholar
Amazon Web Services (Remote) | Jul 2022 - Jun 2023

- Engineered a Deep Racer model using Proximal Policy Optimization (PPO), achieving top 15% performance in a global AWS Summit competition

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TECHNICAL SKILLS

Quantum Frameworks: Qiskit (Expert), PennyLane (Expert), Torch Quantum (Advanced), CuQuantum (Intermediate), ffsim, Stim

Quantum Algorithms: VQE, QAOA, SQD, QML (QNNs, Quantum Kernels), QEC (Surface Codes), Shor's Algorithm

Programming Languages: Python (Expert), C++, JAX, JavaScript, CUDA C++/Python

ML/AI Frameworks: PyTorch, TensorFlow, Hugging Face (Transformers, Diffusers), PINNs, Computer Vision (NeRF, SfM)

HPC & Cloud: CUDA, Google Cloud (TPUs), AWS, Linux, Docker, Git

PUBLICATIONS & AWARDS

🏆 **1st Place Winner** – Yale Quantum Hackathon 2025

🏆 **8th Place Finalist** – JAX Diffusers Global Competition (Hugging Face & Google Cloud)

📄 **"Improved Pothole Detection Using YOLOv7 and ESRGAN,"** *arXiv:2401.08588*

📄 **"Solving The Travelling Salesman Problem using HNN and HNN-SA algorithms,"** *arXiv:2202.13746*