Binay Dalai

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EDUCATION

- **The Pennsylvania State University** — University Park, USA
  Bachelor of Science in Computer Science — *Expected Graduation: December 2026*

  Minor: *Mathematics* **GPA:** *3.91* **Dean's List:** *Fall 2023, Spring 2024, Fall 2024*
  Courses: *Systems Programming, Data Structures and Algorithms, Programming Concepts, Systems Organization and Design*

SKILLS SUMMARY

- **Languages**: Python (3.13.1), C (C23), SQL (2022), JAVA(JDK 21), Scikit(1.6.1), TensorFlow(2.16.1), Keras (3.8.0)
- **Tools, and Platforms**: Docker(27.1), GIT(2.45.2), MySQL(8.0), Linux(6.13), Qiskit(1.3.1), IBM Cloud(1.3)
- **Certifications**: Machine Learning (Stanford), Mathematics for ML: Multivariate Calculus (Imperial College London)

EXPERIENCE

- **IBM** — State College, PA
  AI Engineer Co-op Intern – Midwest Client Engineering Team — *May 2025 – Present*
  - Collaborating with the Midwest Client Engineering Team to design and deploy AI-powered solutions tailored for enterprise clients, focusing on natural language processing, generative AI, and machine learning.
  - Building and optimizing scalable AI models using IBM Watson, Red Hat OpenShift, and foundational models for real-time client applications in cloud-native environments.

- **Lockheed Martin** — University Park, PA
  Machine Learning Engineer — *December 2024-April 2025*
  - Working on the Lockheed Martin "Learned Virus Mitigation Project" under the Penn State Nittany AIAdvance. Developing machine learning models, including reinforcement learning, physics-informed neural networks and Neural ODEs (SEIRV), to predict virus spread, optimize containment strategies, and schedule care actions in dynamic scenarios.
  - Integrating high-performance computing techniques with AI-driven simulations to enhance virus spread modeling, leveraging GPU acceleration and quantum computing methodologies for faster and more accurate predictions
  - Developing AI/ML solutions to find, track, and stop virus spread in containment scenarios by predicting virus propagation,optimize containment strategies and schedule care actions using tools and platforms like Python, TensorFlow, Qiskit, PyTorch, NumPy, SciPy, and CUDA.

- **Nirma University, Department of Computer Science and Engineering** — Ahmedabad, India
  Summer Research Intern — *May 2024 - August 2024*
  - Completed the "Quantum-Based Transformer Model" research project, with the aim of improving the efficacy of the AI Transformer Model **by around 50 %** and reducing the time of data processing **by 30 %.**
  - Implemented hybrid quantum-classical optimization techniques to improve the scalability of AI Transformer models, enabling efficient processing of large-scale datasets with reduced computational overhead.
  - Designed optimized solution for the Google BERT Transformer model by analyzing a section of large datasets, and implementing the Quantum approximate optimization algorithm, leading to **a 43 %** increase in efficiency of an AI transformer model using tools like Python, TensorFlow, Qiskit, and PyTorch.

- **Indian Institute of Technology, Gandhinagar** — Gandhinagar, India
  Intern (Part-time) — *May 2024 - June 2024*
  - Worked on the "Generative AI meets Quantum Software Engineering" project giving emphasis to Green Computing by developing a Qiskit-Based Quantum algorithm for enhancing the CPU performance.
  - Explored and applied quantum circuit optimizations to reduce energy consumption in AI-driven computations, contributing to sustainability efforts in green computing.
  - Designed and implemented a Machine Learning solution, resulting **in a 57 %** increase in accuracy, leading to more impactful decision for Green Computing using Qiskit, NumPy, JavaScript, SQL, Python Programming , C Programming.

PROJECTS

- **Learned Virus Mitigation Project**: Collaborating on the Learned Virus Mitigation project under the Penn State Nittany AI Alliance, focusing on developing AI-driven solutions for infectious disease forecasting. Contributed to building physics-informed neural networks (PINNs) and dynamics-informed neural networks (DINNs) using epidemiological models like SEIRV to predict virus spread and outcomes using tools like **PyTorch, NumPy, Pandas, and Tdqm** . Working with diverse datasets, including WHO, CDC, JHU and US data, to analyze socioeconomic factors and creating a web interface for real-time predictive visualizations using using **Google Earth, Vercel and MS Azure**.

- **Quantum-Based Transformer Model**: Designed experimental protocols and analyzed large datasets to validate the performance of a Pre-Trained Transformer Model. Optimized the Quantum Approximate Optimization Algorithm (QAOA) by refining the cost function, resulting in **a 43 %** efficiency improvement in the AI Transformer Model. Implemented variational quantum circuits and fine-tuned hyperparameters to enhance model convergence. Developed custom quantum kernels for feature embedding and conducted benchmarking against classical optimization techniques. Tech: **Python, TensorFlow, Qiskit, PyTorch, NumPy, SciPy, and CUDA**.

Campus Involvement

- **Penn State Learning Center**   Pennsylvania State University
  Mathematics Tutor   *August 2024- May 2025*
  - Currently tutoring , mentoring and grading students for College Level Calculus- I and II. Tutoring approximately 500 students enrolled in introductory and foundational mathematics courses (0-100 Level Math courses)

- **Penn State College of Engineering**   Pennsylvania State University
  Computer Science Grader   *January 2025-May 2025*
  - Currently mentoring and grading students for Discrete Mathematics i.e. CMPSC 360 . Grading approximately 500 students enrolled in this (0-100 Level Math courses)