Zeyad Ahmed Hussein

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Professional Profile

High-achieving Computer Science student (GPA: 3.9/4.0) and USAID Scholar specializing in quantum computing and machine learning. Experienced in quantum algorithm implementation (Qiskit, Cirq) with proven success in quantum chemistry simulations and quantum optimization. Demonstrated research aptitude through peer-reviewed conference presentations and competitive hackathon achievements. Seeking to contribute to advancing quantum computing research through rigorous theoretical analysis and practical implementation.

Research Interests

Quantum algorithms and optimization, quantum machine learning, variational quantum eigensolvers (VQE), quantum chemistry simulations, quantum authentication protocols, and applications of quantum computing to computational chemistry and optimization problems.

Education

- **Ain Shams University** — Cairo, Egypt
  Bachelor of Computer Science - Artificial Intelligence - GPA: 3.9/4.0 (A+) — *Expected Jul 2027*
  - **Class Rank**: Ranked 3rd out of 61 students in Computer Science - Artificial Intelligence program
  - **USAID Scholar**: Recipient of fully funded scholarship from United States Agency for International Development
  - **Relevant Coursework**: Quantum Computing, Data Structures, Algorithms, Machine Learning, Linear Algebra, Probability & Statistics, OOP, Databases, Software Engineering, Computer Architecture
  - **Dean's List**: Top 3 performer - Three consecutive semesters (Spring 2024, Fall 2024, Spring 2025)

Research Experience

Independent Research Projects — Various Institutions

Quantum Computing Research

- **Alexandria Quantum Hackathon - 1st Place**: Developed quantum chemistry simulation for NH3 + CO2 reaction using VQE; implemented custom ansatz circuits and benchmarked against classical methods (Sep 2025)
- **Nile University Quantum AI Hackathon - 2nd Place**: Designed quantum machine learning model to predict Air Quality in Egypt regions (2025)
- **AUC Quantum Hackathon - 2nd Place**: Designed quantum optimization framework leveraging quantum entanglement for combinatorial optimization problems (2025)
- **EURECA Research Conference 2025**: Presented "Quantum Authentication Protocol use case Based on BB84" at American University in Cairo's undergraduate research conference, demonstrating secure quantum communication implementation

Technical Skills

- **Quantum Computing**: Qiskit, Cirq, VQE, QAOA
  Programming Languages: Python, C++, Java, C#, JavaScript
  ML/AI Frameworks: PyTorch, TensorFlow, Scikit-learn, Pandas, NumPy
  Scientific Tools: LaTeX, Git, Jupyter, MATLAB (basic)
  Software Development: OOP, Algorithms, Data Structures, Software Engineering
  Languages: Arabic (Native), English (IELTS 7.5 - C1), German (A2)

Quantum Computing Projects

- **Quantum Chemistry Simulation: NH3 + CO2 Reaction** Alexandria Quantum Hackathon 2025
  Qiskit,VQE *Sep 2025*
  - **Variational Quantum Eigensolver**: Implemented VQE algorithm to compute ground state energies and reaction pathways for ammonia-carbon dioxide chemical system
  - **Quantum Hardware Execution**: Deployed and executed quantum circuits on IBM quantum hardware, analyzing real-device noise characteristics
  - **Benchmarking & Analysis**: Benchmarked quantum simulation results against classical computational chemistry methods; analyzed convergence behavior
  - **Recognition**: Awarded 1st place for technical implementation and qualified to compete in the NYUAD Hackathon in United Arab Emirates
  - **GitHub**: github.com/YousefElbrolosy/carbon-capturing-alex-hackathon
- **Air Quality Prediction using Quantum Machine Learning** Nile University Quantum AI Hackathon
  Quantum LSTM, Qiskit, PyTorch *Sep 2025*
  - **Quantum-Enhanced Neural Network**: Developed hybrid quantum-classical LSTM model integrating variational quantum circuits for air quality prediction in Egypt
  - **IBM Quantum Hardware**: Executed quantum layers on IBM quantum processors, evaluating performance under real hardware noise
  - **Real-World Application**: Trained and evaluated model on environmental datasets; compared quantum performance against classical LSTM baseline
  - **Performance Analysis**: Analyzed quantum advantage in time-series prediction tasks and assessed computational efficiency trade-offs
  - **Recognition**: Awarded 2nd place for innovative application of QML to environmental forecasting
  - **GitHub**: github.com/zeyadahmedh/Air-Quality-Prediction-Using-Quantum-Computing
- **Quantum Authentication Protocol - BB84 Implementation** EURECA Research Conference
  Cirq, Python *2025*
  - **Protocol Implementation**: Implemented BB84 quantum key distribution protocol demonstration and application on a real scenario
  - **Security Analysis**: Analyzed security guarantees against eavesdropping attacks and evaluated key generation rates under various noise conditions
  - **Conference Presentation**: Presented the project at EURECA 2025 at American University in Cairo
  - **GitHub**: github.com/zeyadahmedh/BB84-Protocol-Application-in-Authetiacation
- **Quantum Optimization of Vehicle Routing Problem** AUC Quantum Hackathon
  Qiskit, QAOA *Jan 2025*
  - **Algorithm Design**: Developed quantum optimization tool for Vehicle Routing Problem using Quantum Approximate Optimization Algorithm (QAOA)
  - **Achievement**: Secured 2nd place for innovative approach to leveraging quantum phenomena for classical optimization

Selected Machine Learning Projects

- **Forest Cover Type Classification** Python, Scikit-learn
  Random Forest, XGBoost, SMOTE *Jul 2025*
  - **Advanced Classification**: Applied ensemble methods and hyperparameter tuning for multi-class forest cover prediction; achieved 85%+ accuracy
- **US Accidents Data Analysis** Python, Pandas, Matplotlib
  Exploratory Data Analysis *May 2025 – Jun 2025*
  - **Large-Scale Analysis**: Analyzed 1M+ accident records, uncovering temporal and geographic patterns; visualized insights for data-driven decision making

Quantum Computing Certifications & Training

- **IBM Qiskit Summer School 2025 - Quantum Excellence**: Intensive program covering advanced quantum algorithms and error correction (Aug 2025)
- **QWorld QBronze Diploma**: Quantum computing fundamentals: superposition, entanglement, quantum gates (Aug 2025)
- **QWorld QNickel Diploma**: Advanced quantum algorithms including Grover's and Shor's algorithms (Aug 2025)
- **Quantum Summer Training**: Nile University - Quantum circuit design and implementation (Aug 2025)
- **Coursera Machine Learning with Python**: Statistical learning and model evaluation (Sep 2024)
- **British Council IELTS Academic**: Score: 7.5 (C1) - Valid until Aug 2026

Additional Experience

- **Digital Egyptian Pioneers Initiative** — Cairo, Egypt
  Machine Learning Engineer Trainee — *July 2025 – Present*
  - **Government-Sponsored Training**: Enrolled in Ministry of Communications & IT program covering ML, deep learning, NLP, computer vision, and cloud deployment
- **Commercial International Bank** — Cairo, Egypt
  Summer Intern — *July 2025 – August 2025*
  - **Financial Technology**: Completed internship focusing on sustainable finance and fintech applications
- **IEEE Ain Shams University Branch** — Cairo, Egypt
  Media Committee Member — *Nov 2024 – Present*
  - **Technical Communication**: Design technical content and campaign visuals

Honors & Achievements

- **Dean's List - Three Consecutive Semesters**: Top 3 performer in Computer Science program (Spring 2024, Fall 2024, Spring 2025)
- **Alexandria Quantum Hackathon - 1st Place**: Quantum chemistry simulation using VQE for molecular systems (2025)
- **Nile University Quantum AI Hackathon - 2nd Place**: Quantum LSTM to predict Egypt Air Quality
- **AUC Quantum Hackathon - 2nd Place**: Quantum optimization framework based on entanglement (2025)
- **USAID Scholarship Recipient**: Fully funded scholarship for academic excellence and leadership potential