ASIF AKHTAB RONGGON

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OBJECTIVE

A passionate Electrical and Electronic Engineering graduate with major in **Communication and Signal Processing** with a solid foundation in **quantum computing, quantum communication, quantum information processing, machine learning and signal processing**. The aim is to contribute to academia or industry through impactful teaching and research, focusing on **quantum machine learning, quantum communication, and hybrid quantum-classical systems**. Committed to simplifying complex ideas and inspiring curiosity, I seek a role to teach future engineers and advance research in a collaborative environment.

RESEARCH INTEREST

- **Quantum Machine Learning**
- **Quantum Communication**
- **Quantum Information Processing**
- **Machine Learning**
- **Deep Learning for Medical Application**
- **Quantum Algorithm**
- **Computer Vision**
- **Quantum Image Processing**
- **Quantum Error Correction**

EDUCATION

- **Bangladesh University of Engineering and Technology**
  Bachelor of Science in Electrical and Electronic Engineering Dhaka, Bangladesh
  - **2020 - 2025**
  - **CGPA: 3.74/4.00**
- **Notre Dame College**
  Dhaka, Bangladesh
  - **2017 - 2019**
  - **Grade: 5.00/5.00**

SKILLS

- **Programming Languages:** Python, C, C++, Matlab, Verilog, Assembly Language
- **Simulation Software:** PSpice, Proteus, Quartus, Simulink, Keil, Autocad, COMSOL
- **Data Science & Machine Learning:** TensorFlow, PyTorch, Scikit-learn, NumPy, Pandas, Matplotlib
- **Other Tools & Technologies:** OpenCV, Qiskit, Pennylane, LaTeX, MATLAB
- **Soft Skills:** Organizing, Collaborating, Teaching, Academic Writting

PROJECTS

- **Comparative Analysis of YOLO Architectures and CNN SWIN Transfer for Blood Cell Detection** [GitHub]
  ***Tools**: [Roboflow, Jupyter IDE, OpenCV, TensorFlow]*
  - Developed a high-accuracy blood cell detection system using YOLO architectures.
  - Compared CNN SWIN Transfer with YOLO-based models for enhanced diagnostic precision.
- **Quantum Image Processing for Edge Detection** [GitHub]
  ***Tools**: [Qiskit, Jupyter Notebook, Python]*
  - Implemented quantum Hadamard edge detection using Qiskit.
  - Explored quantum image representations (NEQR, FRQI) for advanced processing.
- **IoT-Based Sleep Monitoring with ML and Safety System** [GitHub]
  ***Tools**: [ESP32, Arduino, Python, Thingspeak, SVM]*
  - Developed an IoT system integrating multiple sensors for sleep monitoring.
  - Achieved 96% accuracy using SVM for sleep quality prediction.
- **Gesture-Controlled Wheelchair for Disabled People** [GitHub]
  ***Tools**: [Arduino Uno, MPU6050, RF Modules]*
  - Built a wheelchair controlled via hand gestures using accelerometers.
  - Integrated obstacle detection and RF communication for safe navigation.
- **Voice Keyword Detection using DTW** [GitHub]
  ***Tools**: [MATLAB, MFCC, DTW, App Designer]*
  - Implemented MFCC and DTW-based voice keyword recognition.
  - Achieved 90.47% accuracy under ideal conditions.
- **AgroBot: AI-Driven Weed Detection and Elimination** [GitHub]
  ***Tools**: [ROS, YOLOv5, TensorFlow, OpenCV, Docker]*
  - Developed an autonomous rover for real-time weed detection and pesticide spraying.
  - Integrated YOLOv5 and ROS for precise navigation and detection.

JOB EXPERIENCE

- **Research Supervisor**
  June 2025 - Present **ResearchBuddy AI**
  - **Supervising research projects in Quantum Computing, Quantum Communication, and Quantum Machine Learning, providing mentorship and academic guidance for research papers and projects, and leading discussions on recent advancements in quantum technologies.**

PATENTS AND PUBLICATIONS

C=CONFERENCE, J=JOURNAL, S=IN SUBMISSION, W=WORK IN PROGRESS

[J.1] **Performance Analysis and Noise Impact of a Novel Quantum KNN Algorithm for Machine Learning** (Accepted in IEEE ACCESS Journal)[Preprint]

- Proposed a novel Quantum k-Nearest Neighbors (QKNN) algorithm leveraging quantum properties for enhanced classification.
- Conducted experiments on benchmark datasets (Breast Cancer, Iris, Bank Note Authentication) to evaluate QKNN's performance.
- Compared QKNN with classical KNN and quantum neural networks (QNN), demonstrating superior performance in complex datasets.
- Investigated the impact of quantum noise on QKNN, highlighting the importance of quantum error correction techniques for robustness.

[J.2] **Quantum-Enhanced Dimensionality Reduction: Bridging Classical and Quantum Machine Learning** (Under Review in AVS Quantum Science Journal) [Preprint]

- Integrated quantum-inspired and classical methodologies to enhance classification performance.
- Feature selection (Chi-square test) and dimensionality reduction (PCA, KPCA, QPCA, QVAE).
- Applied Classifiers: SVM and Quantum Neural Network (QNN).
- Evaluated models to demonstrate improved classification accuracy in diverse datasets.

[J.3] **Hybrid Quantum-Classical Algorithms for Path Planning: QAOA-A* and CQRW-A***. (Under review in IEEE transactions on Quantum Engineering.) [Preprint]

- Developed Quantum Enhanced A* algorithm using Quantum Approximate Optimization Algorithm and Quantum Random Walk Algorithm, which finds better optimum path than the traditional A* algorithm.

[J.4] **Quantum target state preparation using Quantum Native loss based Quantum Neural Networks** . (Under review in Quantum Science and Technology.) [Preprint]

- Developed a quantum fidelity based loss function for Quantum Neural Networks to generate the target quantum state for quantum algorithms.

[C.1] **Design and Implementation of a Low-Cost and Logic-Based Traffic Light Controller with Pedestrian Integration** (Accepted at the IEEE QPAIN 2025 conference) [Preprint]

- This paper presents a low-cost, logic-based traffic light control system for a four-way intersection, implemented using Verilog HDL, simulated in Proteus, and built with 555 timer ICs, CD4017 counters, and logic gates. The system manages vehicular and pedestrian signals with push-button switches and is extendable for real-world applications, despite current limitations in pedestrian routing.

[C.2] **Greedy Optimization for Enhancing Satellite-Based Quantum Key Distribution Performance** (Accepted at the IEEE QPAIN 2025 conference) [Preprint]

- This paper presents a simulation-based optimization approach for satellite-based Quantum Key Distribution (QKD) systems, utilizing a Greedy Optimization Agent to dynamically adjust parameters, resulting in improved quantum key rate, error rates, and system efficiency.

CERTIFICATIONS

- **Kaggle Courses**
  - Data Visualization
  - Feature Engineering
  - Intro to AI Ethics
  - Machine Learning Explainability