

Syed Emad Uddin Shubha

+1 (225) 384-3970 | shubha.buet@gmail.com | in/syedshubha | syedshubha.github.io

RESEARCH INTEREST

- Quantum Communication
- Quantum Cryptography
- Quantum Error Correction
- Optics and Photonics
- Quantum Algorithm
- Deep Learning

EDUCATION

Louisiana State University

January 2025 – Present

Computer Science

Courses: Quantum Technologies, Programming Language Structures

Bangladesh University of Engineering and Technology

February 2017 – May 2022

B.Sc. in Electrical and Electronic Engineering

CGPA: 3.24/4.00

RESEARCH EXPERIENCE

Graduate Research Assistant — Louisiana State University, USA January 2025 - Present

- Currently working on a research project, "Increasing Teleportation Fidelity using Stabilizer Code based on Information Entropy Metrics" under Dr. Tasnuva Farheen, where I am using Quantum Discord and Entanglement of Formation as metrics to enhance quantum teleportation. I have presented my progress so far at Q-Net Symposium 2025 by LSU APS Chapter. I am also studying Quantum Machine Learning.

Research Assistant — North South University, Dhaka

June 2022 - May 2024

- Engaged in diverse quantum research projects under the supervision of Dr. Mahdy Rahman Chowdhury.
- Working primarily as a researcher and occasionally co-supervising research students.
- Published a high-impact journal article on Quantum Communication (as 1st author) in Heliyon (Q1-indexed). Another paper on Surface Code has been presented at IEEE ICTP 2023. I was also involved in four research projects on quantum cryptography, algorithms, and quantum energy teleportation (the arXiv versions are available).

Undergraduate Research — Bangladesh University of Engineering and Technology (BUET)

- Conducted an undergraduate thesis on quantum communication under the supervision of Dr. Md. Saifur Rahman.
- Conducted research on deep learning in MI - BCI task classification.
- Both of these works were conducted during the undergraduate final year and have been published in IEEE conferences.

PUBLICATIONS

• JOURNAL PUBLICATION:

1. **Syed Emad Uddin Shubha**, Md. Saifur Rahman, M.R.C. Mahdy, "Significant improvement of fidelity for encoded quantum bell pairs at long and short-distance communication along with a generalized circuit." Heliyon (Q1-indexed, IF: 4.00), Volume 9, Issue 9. [doi: 10.1016/j.heliyon.2023.e19700](https://doi.org/10.1016/j.heliyon.2023.e19700).

• IEEE CONFERENCE PROCEEDINGS:

2. "Effect of Quantum Repetition Code on Fidelity of Bell States in Bit Flip Channels." In 2022 12th International Conference on Electrical and Computer Engineering (ICECE). [doi: 10.1109/ICECE57408.2022.10088665](https://doi.org/10.1109/ICECE57408.2022.10088665).
3. "Effect of EOG Artifact Removal on EEG Motor-Imagery Classification." In 2022 25th International Conference on Computer and Information Technology (ICCIT). [doi: 10.1109/ICCIT57492.2022.10056062](https://doi.org/10.1109/ICCIT57492.2022.10056062).
4. "RESCUED: Robust Quantum Error Correction With Surface Code In Noisy Channels Using Ensemble Decoder." In 2023 IEEE International Conference on Telecommunications and Photonics (ICTP). [doi: 10.1109/ICTP60248.2023.10490960](https://doi.org/10.1109/ICTP60248.2023.10490960).

• arXiv PREPRINTS:

5. "Edge Detection Quantumized: A Novel Quantum Algorithm For Image Processing." ([arXiv:2404.06889](https://arxiv.org/abs/2404.06889))(under review).
6. "Enhancing the security of image transmission in Quantum era: a chaos-assisted QKD approach using entanglement" ([arXiv:2311.18471](https://arxiv.org/abs/2311.18471))(under review).
7. "Multi-Layered Security System: Integrating Quantum Key Distribution with Classical Cryptography to Enhance Steganographic Security" ([arXiv:2408.06964](https://arxiv.org/abs/2408.06964))(under review).
8. "Enhanced Quantum Energy Teleportation using a 3-Qubit System" ([arXiv:2408.07997](https://arxiv.org/abs/2408.07997))(On Progress).

TEACHING EXPERIENCE

Teaching Assistant — BRAC University, Dhaka

June 2023 - December 2024

- Conducting CSE 482 (Quantum Computing II) tutorials and problem-solving classes.
- Conducting MAT120 lab sessions, teaching students how to solve calculus problems using Python.
- Teaching numerical methods and Python libraries, including NumPy, Matplotlib, SymPy, and SciPy.
- Creating assignments, administering tests for student assessment, and grading them.

Quantum Information Instructor — Tensor & MRA

January 2024 - November 2024

- Instructor at the 3rd PSI-Tensor Winter School for theoretical physics (Quantum Information Part).
- Conducting live sessions on Quantum Information (theory and simulations using QISKIT, Cirq, etc.) at MRA.

NOTABLE PROJECTS

- **Quantum Image Encoding and Decoding using Qiskit** — [*GitHub Link*](#).
 - Implemented quantum image encoding algorithm using FRQI and NEQR method.
 - Generalized both encoding circuit, also developed the decoding method.
 - Two Python libraries were used: *Qiskit* to simulate quantum circuit, *Matplotlib* for image processing.
- **Load Flow Analysis for n Bus using Gauss-Siedel Algorithm** — [*GitHub Link*](#).
 - Developed a load flow analysis program for n-bus power systems during the junior year of undergraduate studies.
 - Implemented generalized Gauss-Siedel algorithm and generated output for user defined tolerance.
 - Coding was performed using MATLAB, and for file input/output management, CSV files were employed.
- **Bengali Speech Emotion Detection using Machine Learning** — [*GitHub Link*](#).
 - Conducted research on Bengali Speech Emotion Detection during the junior year of undergraduate studies.
 - Created a classification model for four emotions in Bengali speech: Sad, Happy, Angry, and Neutral.
 - Developed a training dataset and used MATLAB for the implementation.

SKILLS SUMMARY

Programming Language : Python, MATLAB, C, C++, Assembly language.

Simulation Software : PSpice, Proteus, Quartus, Simulink.

Office Application : Microsoft Office Suite, LaTeX.

Soft Skills : Organizing, Collaborating, Teaching, Writing.

HONORS AND AWARDS

- Presented at Q-Net Symposium by LSU APS Chapter(2025).
- Invited Speaker at SQuIC, BRACU on Quantum Communication (2024).
- Keynote Speaker at the event “Quantum Computing & Mechanics: Technical Prospects & Opportunities in Higher Studies” organized by IEEE NSU Student Branch (2022).
- 1st position in Mathematical Olympiad (University Level) of International Day of Mathematics organized by Bangladesh Mathematical Society (2021).
- University Admission Test Scholarship (2017) and Technical Scholarship (up to all semesters).
- General Scholarship, Cumilla Board, S.S.C 2014 and Talentpool Scholarship, Cumilla Board, J.S.C 2011.

SELECTED CERTIFICATIONS

- Completed “Tensor PSI Winter School for Theoretical Physics”. (2023)
- Completed “Qiskit Global Quantum Summer School” organized by The Coding School. (2021)

EXTRA-CURRICULAR ACTIVITIES

- Assisted in the distribution of PPE during the COVID-19 emergency.
- Volunteered in the distribution of winter clothes in remote villages.
- Organized a nationwide online course on quantum mechanics and quantum computing.
- Engaged in numerous science outreach initiatives through writing blogs and articles.