Syed Emad Uddin Shubha

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PROFILE

As an aspiring researcher in the field of Quantum Information, I have cultivated a robust theoretical foundation, demonstrated proficiency in programming, and exhibited the capability to perform intricate analytical calculations. My unwavering passion for research serves as the driving force behind my continuous pursuit of knowledge and growth within this field.

RESEARCH INTEREST

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

EDUCATION

Bangladesh University of Engineering and Technology   February 2017 – May 2022
B.Sc. in Electrical and Electronic Engineering   CGPA: 3.24/4.00
Relevant Courses: Signals and Systems, Engineering Electromagnetics, Electrical Properties of Materials, Solid State Devices, Random Signals and Processes, Control Systems I, Wireless Communication.

RESEARCH EXPERIENCE

Research Assistant — North South University, Dhaka   June 2022 - Present

- 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 accepted for presentation at IEEE ICTP 2023. Additionally, I am currently working on two more research projects, with manuscripts under preparation.
- Ongoing Research Projects (Co-supervised with Dr. Mahdy Rahman Chowdhury):

1. **Syed Emad Uddin Shubha**, Mir Muzahedul Islam, Tanvir Ahahmed Sadi, Md. Hasibul Hasan Miraz, M.R.C. Mahdy. "Implementation of a Modified QHED Algorithm for Better Edge Detection." (Manuscript Under Preparation).
2. Raiyan Rahman, Md Shawmoon Azad, Mohammed Rakibul Hasan, **Syed Emad Uddin Shubha**, M.R.C. Mahdy. "A Secure Image Transmission Scheme Using Chaotic System and Quantum Entanglement."(In Preparation).

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 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), **doi: 10.1016/j.heliyon.2023.e19700**.

- **CONFERENCE PROCEEDINGS:**

2. **Syed Emad Uddin Shubha**, and Md. Saifur Rahman. "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), pp. 368-371. IEEE, 2022. **doi: 10.1109/ICECE57408.2022.10088665**.

3. Md Asif Iqbal, Md Maisoon Rahman, Sami Muhtasim, **Syed Emad Uddin Shubha**, and Mahmudul Hasan. "Effect of EOG Artifact Removal on EEG Motor-Imagery Classification." In 2022 25th International Conference on Computer and Information Technology (ICCIT), pp. 850-854. IEEE, 2022. **doi: 10.1109/ICCIT57492.2022.10056062**.

4. Saikat Barua, **Syed Emad Uddin Shubha**, Monika Rahman, Apurba Jalal Uchash, M.R.C. Mahdy. "RESCUED: Robust Quantum Error Correction With Surface Code In Noisy Channels Using Ensemble Decoder." (**Accepted for presentation at IEEE ICTP 2023**).

TEACHING EXPERIENCE

Teaching Assistant — BRAC University, Dhaka   **June 2023 - Present**
- Conducting MAT120 lab sessions, teaching students how to solve calculus problems using Python.
- Creating assignments, administering tests for student assessment, and grading them.

NOTABLE PROJECTS

- Quantum Image Encoding and Decoding using Qiskit - **GitHub Link**.
  - Implemented quantum image encoding and decoding using IBM Qiskit in Python.
  - Generalized the encoding circuit for both FRQI and NEQR methods and developed the decoding method.
- 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.
  - Wrote MATLAB code for the generalized Gauss-Siedel Algorithm and used MS Excel for I/O file management.
- Bengali Speech Emotion Detection using Machine Learning.
  - 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.

TEST SCORES

IELTS: Overall: 7.5/9.0 (Reading: 8.5, Listening: 7.5, Writing: 6.5, Speaking: 6.5).

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

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

EXTRA-CURRICULAR ACTIVITIES

- Assisted in the dissemination of PPE during the Covid-19 emergency.
- Volunteered in the distribution of winter clothes in remote villages.

REFERENCES

Dr. Mahdy Rahman Chowdhury,	Dr. Md. Saifur Rahman,
Associate Professor, ECE Department,	Professor, Department of EEE,
North South University, Dhaka.	Bangladesh University of Engineering and Technology.
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