

Shah Ishmam Mohtashim

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Education

University of Dhaka

Dhaka, Bangladesh

B.S. IN CHEMISTRY

2017 - 2022

- Thesis: Quantum Chemical Computations of the Properties of Hydrogen, Oxygen and Water
- Minor in Physics and Mathematics

Publications

2022 **Qurzon: A Prototype for a Divide and Conquer Based Quantum Compiler,** *SN Computer Science*
10.1007/s42979-022-01207-9

Preprints

2022 **Mathematical bridge between epidemiological and molecular data on cancer and beyond,** *bioRxiv*
2022.09.07.507053

2021 **On The Variational Formulations For The Graph Isomorphism Problem,** *arxiv:2111.09821*

2021 **Disordered Phase in Ising and Metastability in Cellular Potts Models Hint at Glassy Dynamics,** *arXiv:2106.11298*

Projects

Network Analysis of Proteins

FUNCTIONAL PROTEIN RESEARCH GROUP

Ongoing

- Proposed the research idea, transformed the proteins to network formulations; leading the group
- Residue Interaction Network, Gaussian Network Model and Anisotropic Network Model to predict protein active sites and dynamics.

Subspace Search Variational Quantum Eigensolver

Project Link

PENNYLANE COMMUNITY DEMOS

August 2021

- Proposed the idea, helped program the algorithm

Variational Quantum Thermalizer for the Sherrington-Kirkpatrick model

Blog post link

MICROSOFT CHALLENGE AT THE QUANTUM COALITION HACKATHON 2022

April 2022

- Proposed the idea, helped program the algorithm and wrote the blog post

Hack the Q-Map: Guess the terrain of the quantum map

Project link

MIT IQHACK 2022 x MICROSOFT x IONQ CHALLENGE

January 2022

- Proposed the initial idea and outlined the quantum terrain generation procedure.

Diagonal Unitary Circuit Decomposer

Project link

QUANTUM COALITION HACK

April 2021

- Formulated and programmed a decomposer/transpiler that takes in diagonal unitary matrix and returns quantum gates.

QAOA Implementation for the weighted MaxCut problem

PERSONAL PROJECT

2021

- Implemented QAOA for weighted MAXCUT using Qiskit.

Nurse Scheduling Problem using Discrete Quadratic Model

MIT QUANTUM HACKATHON

Project link

January 2021

- Implemented DQM of the NSP problem using DWave's Hybrid Solvers.
- Met the obligatory hard nurse and hard shift constraint.

Solving 1D advection equation using classical and quantum algorithm

QUANTUM WINTER HACKATHON

2020

- Formulated the discretization of the wave equation using finite difference method.
- Tested the HHL and VQLS algorithm to solve the PDE of advection equation.

Honors & Awards

2021	Top 20 , Qiskit Hackathon Europe: Research Study Group	
2021	Advanced Badge , IBM Quantum Challenge - Fall 2021	
2021	Advanced Badge , IBM Quantum Challenge Africa 2021	
2021	Advanced Badge , IBM Quantum Challenge 2021	
2020	Advanced Badge , IBM Quantum Challenge -FALL 2020	
2020	Special Mention- Top 10 , Quantum Winter Hackathon	
2018	National Finalist (top 12) , Famelab	<i>Bangladesh</i>
2016	Runners Up, National Round, Invited to attend National Camp , Bangladesh, Biology Olympiad 2016	<i>Bangladesh</i>
2015	2nd Runners Up, National Round, Invited to attend National Camp , Bangladesh, Biology Olympiad 2015	<i>Bangladesh</i>
2015	Top 10, National Round , Bangladesh Astronomy Olympiad 2015	<i>Bangladesh</i>

Talks

Warsaw IT Days 2022

APPROXIMATED APPROACHES TO THE VEHICLE ROUTING PROBLEM ON NISQ DEVICES BY CLASSICAL PREPROCESSING

April 2022

IEEE EDS Dhaka University Chapter: Workshop on Quantum Computing

INTRODUCTION TO QUANTUM COMPUTING AND QUANTUM INFORMATION THEORY

January 2022

Qoffee O'clock, Qindia, YouTube

DETECTION OF GLASSY DYNAMICS USING QUANTUM COMPUTER

July 2021

Community Service

Banglai Quantum Computing

MEMBER

2020-Ongoing

- Quantum Computing Community Building amongst Bengali Speaking People
- Helped organize bi-weekly discussion sessions on Saturdays