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

Qurzon: A Prototype for a Divide and Conquer Based Quantum Compiler, arXiv:2109.07072 — *SN Computer Science*

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

Subspace Search Variational Quantum Eigensolver

Pennylane Community Demos — *August 2021*

Network Analysis of Proteins

Functional Protein Research Group — *Ongoing*

- Residue Interaction Network to measure centrality to identify functional sites of the protein.
- Gaussian Network Model and Anisotropic Network Model to calculate protein dynamics.

Variational Quantum Thermalizer for the Sherrington-Kirkpatrick model

Microsoft Challenge at the Quantum Coalition Hackathon 2022 — *April 2022*

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

MIT iQuHACK 2022 x Microsoft x IonQ Challenge — *January 2022*

- Hack the QMap is a game powered by quantum computing where the players of the game have to build quantum circuits, gate by gate in each move of the game, to generate a terrain which is as close to the original terrain generated by a quantum game engine.

Diagonal Unitary Circuit Decomposer

Quantum Coalition Hack — *April 2021*

- Made a decomposer/transpiler that takes diagonal unitary matrix and returns corresponding quantum gates.

Nurse Scheduling Problem using Discrete Quadratic Model

MIT Quantum Hackathon *January 2021*

- Implemented DQM of the NSP problem using DWave's Hybrid Solvers.
- Met the obligatory hard nurse and hard shift constraint but could not satisy the soft nurse constraint.

QAOA Implementation for the weighted MaxCut problem

Personal Project *2021*

- Calculated MAXCUT using QAOA.

Solving 1D advection equation using classical and quantum algorithm

Quantum Winter Hackathon *2020*

- Discretizing the wave equation using finite difference method with the implicit time integration scheme.
- 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	*Bangladesh*
2016	**Runners Up, National Round, Invited to attend National Camp**, Bangladesh, Biology Olympiad 2016	*Bangladesh*
2015	2^{nd} **Runners Up, National Round, Invited to attend National Camp**, Bangladesh, Biology Olympiad 2015	*Bangladesh*
2015	**Top 10, National Round**, Bangladesh Astronomy Olympiad 2015	*Bangladesh*

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