

# 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](https://doi.org/10.1007/s42979-022-01207-9)

## Preprints

2022 **Mathematical bridge between epidemiological and molecular data on cancer and beyond,** [bioRxiv](#)  
[2022.09.07.507053](https://doi.org/10.1101/2022.09.07.507053)

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](#)

## Work Experience

### University of Calcutta

Kolkata, India

QUANTUM COMPUTING RESEARCH INTERN

Sept. 2021 - June 2022

- Qurzon: A Prototype for a Divide and Conquer Based Quantum Compiler

## Projects

### Network Analysis of Proteins

FUNCTIONAL PROTEIN RESEARCH GROUP

Ongoing

- Proposed and directed the research project to predict protein active sites and dynamics.
- Applied Residue Interaction Network, Gaussian Network Model and Anisotropic Network Model.

### Subspace Search Variational Quantum Eigensolver

[Project Link](#)

[PENNYLANE COMMUNITY DEMOS](#)

August 2021

- Devised the tutorial to demonstrate SSVQE with an implemented 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, programmed the algorithm and wrote the blog post.
- Compared between classical, quantum noise-free and quantum noise-induced simulations.

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

[Project link](#)

MIT IQHACK 2022 x MICROSOFT x IONQ CHALLENGE

January 2022

- Conceptualized the game 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

[Project link](#)

MIT QUANTUM HACKATHON

January 2021

- Implemented Discrete Quadratic Model of the NSP problem using DWave's Hybrid Solvers.

## Solving 1D advection equation using classical and quantum algorithm

QUANTUM WINTER HACKATHON

2020

- Modelled 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	<b>Top 20</b> , Qiskit Hackathon Europe: Research Study Group	
2021	<b>Advanced Badge</b> , IBM Quantum Challenge - Fall 2021	
2021	<b>Advanced Badge</b> , IBM Quantum Challenge Africa 2021	
2021	<b>Advanced Badge</b> , IBM Quantum Challenge 2021	
2020	<b>Advanced Badge</b> , IBM Quantum Challenge -FALL 2020	
2020	<b>Special Mention- Top 10</b> , Quantum Winter Hackathon	
2018	<b>National Finalist (top 12)</b> , Famelab	Bangladesh
2016	<b>Runners Up, National Round, Invited to attend National Camp</b> , Bangladesh, Biology Olympiad 2016	Bangladesh
2015	<b>2<sup>nd</sup> Runners Up, National Round, Invited to attend National Camp</b> , Bangladesh, Biology Olympiad 2015	Bangladesh
2015	<b>Top 10, National Round</b> , 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
- Helped organize bi-weekly discussion sessions on Saturdays