Emon Hossain

CONTACT INFORMATION

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Emon Hossain

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RESEARCH INTERESTS

Differential Geometry	Complex Analysis	Computational Mathematics
Algebraic Geometry	Geometric Deep Learning	Optimization
Mathematical Modeling	Mirror Symmetry	Moduli Space

EDUCATION

Degree	Institution	Concentration	CGPA	Obtained
B.S.	University of Dhaka	Mathematics Minor: Statistics, Physics	3.41	March 2023
M.Sc.	University of Dhaka	Mathematics	-	Yet not published

RESEARCH EXPERIENCE

[1] A. Bhowmik, **E. Hossain**, and M. Hasan, "A review of cryptosystems based on multi layer chaotic mappings," *arXiv preprint arXiv:2208.06002*, 2022.

WORK EXPERIENCE

Research Assistant – NST Project June 2023 – Present
Title: Investigating the Interplay between Diabetes, Hypertension, Blood Pressure, and Breast Cancer Progression: Early Detection and Cellular Dynamics

- Utilizing stochastic model and analyzing real-world data to develop intricate models aimed at understanding the complex interactions between diabetes, hypertension, blood pressure, and breast cancer progression.

Advisor: Dr. Chandra Nath Podder
Professor, Department of Mathematics
University of Dhaka, Bangladesh
cpodder@du.ac.bd

MS Thesis June 2023 - April 2024
Title: Connection deformation of Calabi-Yau Manifolds

- Investigating complex geometry
- Exploring characteristic classes to classify vector bundles
- Understanding the implications of Kähler geometry and Chern classes in the study of Calabi-Yau manifolds and defining a deformed Calabi-Yau manifold where we twisted the differential and derived a twisted connection. And come up with a new conjecture.

Advisor: Dr. Md. Shariful Islam
Assistant Professor, Department of Mathematics
University of Dhaka, Bangladesh
mathforest@gmail.com

PSI Winter School in Theoretical Physics January 8th to 20th, 2024
Selected for the Tensor PSI Winter School, which is a two-week-long winter school organized in collaboration between Tensor and the Perimeter Scholars International (PSI) program of the Perimeter Institute in Canada. It provides a blended learning experience covering various topics. The topics covered so far include:

- Symmetries
- Quantum Information
- Numerical Methods

Chairman: Dr. Tibra Ali
Tensor

Undergraduate Project April 2022 – December 2022
Title: Differential Invariant with Global Coordinate Transformations in Neural Networks and Application of Finite Element Method

- Working on a deep autoencoder architecture that can be used to find a coordinate transformation that converts a nonlinear PDE to a linear PDE.
- Experimenting with mesh generation in the finite element method and improving it using autoencoder architecture.

Advisor: Dr. Chandra Nath Podder
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CERTIFICATES

- Quantum Mechanics & Quantum Computing: Theory, COMSOL simulation and IBM QISKIT learning, Certificate, Website
  - Understand the relation with Fourier series & Fourier transform with wave-particle duality
  - Perform quantum wave mechanical simulations by using two different interfaces: Schrödinger Equation interface & Mathematics PDE Interface.

  Instructor: Dr. Mahdy Rahman Chowdhury
  Associate Professor, Dept. of ECE, North South University, Bangladesh

- Natural Language Processing with Classification and Vector Spaces, Coursera

BROADER IMPACTS

Moderator of Mathematics Stack Exchange: emonHR

- Contributed 47+ answers to the community.
- I used this platform to learn about analysis and problem-solving techniques.

I have created several videos on undergraduate topics, ranging from Real Analysis to Mathematical Finance, which can be found on my YouTube channel: Emon Hossain.

Besides, I have organized several programs, including the **Bangladesh Women's Olympiad 2024, 2023** and the **Pi Day Celebration 2019** in my role as the organizer.

TECHNICAL SKILLS

Programming Languages	C, Python, JavaScript, FORTRAN, SQL
Mathematical Packages	Mathematica, Maple, MATLAB
Typesetting Software	LaTeX
Image Processing Software	Adobe Photoshop
3D Modeling and Animation Package	Blender, Manim
GUI Framework	Tkinter
Tool	Git, Docker, Firebase

REFERENCES

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