

Alik Mondal

Barasat, Kolkata, Pin : 700124, West Bengal, India

● edualik801@gmail.com

● +91 6291563349

● [linkedin.com/in/alik-mondal-921a971aa](https://www.linkedin.com/in/alik-mondal-921a971aa)

I am a self-motivated recent Physics graduate with a passion for Scientific Computing and Machine Learning. As a recent university graduate, my aim is to explore novel avenues that bridge the gap between theoretical frameworks in physics and the field of Deep Learning. My ultimate goal is to utilize intelligent machines to contribute to the discovery of fundamental laws governing various physical systems, thereby advancing towards generalized intelligence. I possess proficiency in producing constructive research outcomes and am currently engaged in the process of publishing my undergraduate thesis.

Experience

Research Intern at Physical Research Laboratory, Indian Space and Research Organization, Ahmedabad (UG Thesis)

Jan 2023 - Apr 2023

- Developed a novel approach that utilizes guided diffusion models and reference-less contrast adjustment, using Chandrayaan-2 OHRC data, to reconstruct images of the Permanently Shadowed Regions (PSR) on lunar poles. This enables geomorphological analysis and water search within those regions.
- Achieved State-Of-The-Art results through the implementation of the proposed method, offering valuable insights into lunar surface understanding and potential implications for future missions, particularly Chandrayaan-3.

Research Intern at Solid State Physics Laboratory, Defence Research and Development Organization, New Delhi

Aug 2022 - Oct 2022

- Successfully applied Trust Constraint and SLSQP techniques to optimize the constrained thermal properties of Single Quantum Well (SQW) LASERs, thereby effectively modeling them.
- Utilized genetic programming effectively to perform multivariate maximization after reframing the problem, thus achieving optimal solution in this complex system.

Founder at iU, Kolkata

Sept 2021 - present

- Founded iU, an edtech startup at the Proof of Concept (POC) stage, with a vision to eradicate social hierarchy-based discrimination in education in India.
- Developing an innovative learning platform automating Math, Science, and English education for children below grade 5, aligning with the Indian schooling system.
- Integrating various chatbots to create a positive teacher-student dynamic, eliminating human frustrations and inconsistencies, and enabling the establishment of a strong educational foundation at an early age.

Education

Bhaskaracharya College of Applied Science, Delhi University

Nov 2020 - June 2023

- Bachelor of Science (Honors), Physics
Division: First Class with **8.52** CGPA

Relevant Modules:

Programming using Python, Computer Networks, Computational Physics, Linear Algebra, Advanced

Mathematical Physics, Tensor Calculus, Real and Complex Analysis, Quantum Mechanics, Statistical Mechanics

Relevant Skills

- **Programming** : Python, C/C++, Git, LATEX, SciLab, HTML, CSS, JavaScript, Fortran, Markdown
- **Tech Stack** : TensorFlow, Keras, Jupyter, MongoDB, Scikit-Learn, OpenCV, Pandas, React, Flask.
- **Specialization** : Machine Learning, Deep Learning, Computer Vision, Probabilistic Programming, Generative Modelling.
- **Others** : Theoretical and Computational Physics

Publication

- **A. Mondal**, R. K. Sinha, S. Kumar "Automatic Contrast Enhancement of Permanently Shadowed Region Images on Lunar Poles." (2023) **[Presented]** in 4th Indian Planetary Science Conference (IPSC) 2023, PRL, Ahmedabad.
- **A. Mondal**, R. K. Sinha, S. Kumar "Cross-Inferential Unsupervised Reconstruction of Permanently Shadowed Lunar Regions using Guided Diffusion" (2023) **[Under Preparation]**

Projects

Condensation Trail Identification in Earth's Upper Atmosphere using Variational Autoencoder with Latent Optimization via Deep Energy-based Model (*Kaggle*) *July 2023*

- Attempting to structure the latent space representation of segmented and unsegmented condensation trail images, using Attended Variational Autoencoders.
- Implementing a Deep Energy-based Model with Langevin sampling to achieve optimal latent displacement across feature clusters, resulting in precise and robust identification of condensation trails.

Gravitational Wave Detection: Detected gravitational wave signals from binary black hole collisions. (*Semester Project*) *March 2021*

- Employed constant Q transform (CQT) and butter-bandpass filtering to preprocess time-series data from 3 LIGO detectors.
- Developed a CNN model utilizing filtered spectrograms as input to accurately classify and detect samples containing gravitational wave signals.

Hybrid RNN and Transformer-based Named Entity Recognition and Emotion Detection in Tweets (*Kaggle*) *June 2021*

- Developed advanced hybrid RNN and Transformer NLP model for Named Entity Recognition and Emotion Detection in tweets.
- Successfully applied the model to analyze Twitter data, demonstrating strong accuracy and understanding of social media text challenges.

BTC-USD Forecasting Using Dense and Recurrent Bayesian Neural Nets (*Kaggle*) *Aug 2021*

- Developed an integrated Dense 1D-CNN and Recurrent Bayesian Neural Nets (RBNN) model to predict closing prices of the BTC-USD pair. Conducted a comparative analysis with Local and Semi-Local Linear Trend models to assess improvements.
- Leveraged historical data for BTC-USD, ETH-USD, and XRP-USD pairs to predict short-term and long-term price trends. Created an interactive web application by hosting the models on Heroku servers.

Additional Courses

- Machine Learning, Stanford University *Aug 2020*
- Deep Learning Specialization, DeepLearning.ai *Jan 2021*
- Deep Learning for Compute Vision, IIT Hyderabad *June 2021*
- Web Development Bootcamp, Udemy *Dec 2021*
- Python for Time Series Forecasting, Udemy *March 2022*
- Statistics for application, MIT *June 2023*

Achievements

- Achieved a ranking of **3rd (9.41 CGPA)** in the first year of Physics undergraduate studies and consistently maintained a position within the **top 5%** throughout the bachelor's program.
- Recognized as one of the youngest presenters to deliver a poster presentation at the 4th Indian Planetary Science Conference, PRL, Ahmedabad.
- Reached the **pre-semifinal** stage with iU at IIT Bombay's Eureka! (Business-Model Competition).

Hobbies

- Counting stars in the night sky.
- Reading fantasy and science fiction novels.
- Playing football and analyzing football tactics.