Aritra Roy

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Education	College/University	Year	CGPA
B.Tech (Double major)	Indian Institute of Technology (IIT) Dhanbad	2020–25	9.08*
Intermediate/+2	Calcutta Boys' School	2019	91.1
High School	Calcutta Boys' School	2017	90.0

* Weighted average of the marks obtained in both the majors

RESEARCH PROJECTS

- **Prospects of energy-efficient power generation system with ammonia as hydrogen carrier | Prof Sandipan Kumar Das** *[May'23-July'24]*
  - A novel approach using ammonia as a hydrogen carrier, which is decomposed to generate hydrogen for combustion, producing steam to power turbines.
  - Emphasizes the impact of parameters such as pressure, temperature, catalyst loading in the FBR, and air flow rate on the performance of individual components and overall system efficiency.

- **Unveiling flow dynamics in asymmetric wavy channels using Physics Informed Neural Networks | Prof Ajay Bhandari** [Dec'23-Oct'24]
  - I proposed a mixed variable deep-learning architecture that reduces the order of derivatives in the momentum equation leading to reduced order modeling.
  - Key flow characteristics—velocity, pressure drop, and wall shear stress—are computed, with PINN results validated against CFD for high accuracy. The study also examines flow separation and recirculation in asymmetric channels.

- **A density stratified DNS simulation of microplastics in geophysical turbulence conditions prevailing in oceans | Prof Rama Govindarajan** [May'22-July'24]
  - Project aims to perform density stratified direct numerical simulation for geophysical turbulence prevalent in oceans.
  - A compact scheme for higher order finite difference scheme was applied to resolve the spatio-temporal scales.
  - In order to study of the effect of salinity variation in ocean on microplastic's transport, an additional study using stokesian drag model was used to study the floating pattern and buoyancy dynamics.

- **Endovascular coil embolization using magnetic needle navigation | Prof Ajay Bhandari** [Sept'22- Dec'23]
  - In order to facilitate the surgery along with maintaining the flow of blood in Internal Carotid Artery, we have proposed a magnetically navigable coil
  - It is made of PDMS resin and hydrogel, flexible enough for smooth navigation and minimizing friction.
  - Its primary focus is to prevent premature rapture of the internal carotid artery.

- **A novel numerical implementation of boundary element method for fluid flow problems| Prof Sandipan Kumar Das** [August'23-may'24]
  - A novel implementation of boundary only discretization technique has been used to solve the non linear problems of fluid mechanics, whose Green's function doesn't exist or is very tedious to evaluate has been simulated to the desired degree of accuracy.
  - This pushed the realms of BEM technique to get independent of Green's function and became capable to solve non linear PDE's.

WORK EXPERIENCE

- **Research Associate | International Center for Theoretical Sciences (Tata Institute of Technology)** [May'24-July'24]

- I was selected as an S N Bhatt fellow with Prof Rama as my advisor during the tenure to guide me on unveiling the turbulent flow physics associated with geophysical turbulence.
- During my tenure at TIFR, I developed a code in Fortran95 for solving the Navier Stokes problem using DNS resolving all the spatio-temporal scales.
- I was also offered an early PHD program from ICTS-TIFR to work in their turbulence physics group.

- **Assistant trainee engineer | Oil and Natural Gas Corporation Limited, Mumbai (Onshore)** [May'23-Jun'23]
  - Understanding the operating procedure for off-shore maintenance service along with the equipments used for servicing and condition monitoring of pipelines.
  - Developed an understanding of the centrifugal pumps and gas turbines used for transportation of oil from off-shore.

PUBLICATIONS

- **Journal Publications**
  - **Aritra Roy**, Soumyajit Sengupta, Arun Kumar Sengupta, PVSS Likhith, Sandipan Kumar Das "Prospects of energy-efficient power generation system with ammonia as hydrogen carrier." *International Journal of Hydrogen Energy*, vol. 71, pp. 131-142, 19th June 2024. [Link].

  - **Aritra Roy**, Balbir Prasad, Ayan Chatterjee, Ajay Bhandari "Unveiling flow dynamics in asymmetric wavy channels using Physics Informed Neural Networks." *Physics of Fluids*, Manuscript number: POF24-AR-ICAFD2024-13907 (**under review**).

- **Conference Proceedings**
  - **Aritra Roy**, Balbir Prasad, Ayan Chaterjee, Ajay Bhandari "Demystifying the flow dynamics of non-Newtonian fluids in electrokinetically modulated typographically patterned channels with PINNs" in *Proceedings of Conference : International Conference on Biological Innovation, Technology, Engineering and Sciences*, Rourkela, India, 2024. (submitted)

AWARDS AND ACCOLADES

- **S N Bhatt Memorial Excellence Fellowship** [Jul'24]
  - Fellowship grant awarded by ICTS-TIFR for exceptional performance in research related to geophysical turbulence.

- **Piyush Dutta Innovation Award** [Jan'23]
  - Recognized as a top innovator in the department in the academic year 2023 for contributing in the field of internal carotid artery haemodynamics by inventing a bio magnetically navigable needle, which proves out to be very useful in surgery.

- **Dr. Goutam Mitra Memorial Award** [Jul'17]
  - Received for high academic pursuits in mathematics at high school level in the entire district.

SKILLS & INTERESTS

- **Programming Languages**: C++, Python, Matlab, Fortran95
- **ML Toolkit & Libraries**: Scipy, Keras, Pytorch, Tensorflow
- **Software**: Ansys Fluent, Comsol Multiphysics, AutoCAD, Solidworks

EXTRACURRICULAR ACTIVITIES

- Cadet 36 -JHARKHAND BN NCC,(Indian Army, Ministry of Defense – Govt. of India) | B certificate qualified [*Mar'22*]
- Secured 346th state rank at Bengal State Level Chess competition – The Telegraph [*Dec'09*]
- Swimming at Bengal Swimming Club at Kolkata and participated in competition winning Silver medal in freestyle and breaststroke category of the competition [*Aug'10*]