# Arnab **Ghosh**

**PhD candidate · Fluid Thermal Engineer · Computational Physicist · HPC Programmer**

@ arnab.sphs12@gmail.com  linkedin/arnab-ghosh  +(31) 6252524768
github/arnab-ghosh  Eindhoven, Netherlands
Indian  21/10/1993

## About me

Passionate Applied Physics PhD candidate with 7 years expertise in modelling complex physical phenomena. Seeking challenging roles in model development, machine learning, and data analysis to contribute to innovative solutions.

## Work experience

May 2019 - Present

### PhD in Applied Physics / Computational Model Developer

- EINDHOVEN UNIVERSITY OF TECHNOLOGY
  - **Mathematical modelling and simulation** of a complex multi-physics phenomenon of liquid jetting under the influence of solid particles in the domain of **ink-jet printing** through collaborations with University of Twente
  - **Software developer** with **DevOps** responsibilities to maintain in-house Lattice Boltzmann code LBE3D for solving fully resolved fluid-particles in multiphase/multicomponent flow in 3D
  - Proficient use of **C Language** with **MPI** on **Linux** platform, using **Git** and **CI/CI pipelines**
  - Deployed High-Performance Computing (**HPC**) resources leveraging **SSH-clients** for large scale simulations
  - Utilised **Python** libraries for analysis and **ParaView, Matplotlib**, and **Gnuplot** for visualisation of large datasets
  - Documentation of developer issues using **Markdown** and **LaTeX**
  - Submitted and published articles in peer-reviewed journals

July 2016 - June 2018

### Mechanical Engineer / Fluid Thermal

- INDIAN INSTITUTE OF TECHNOLOGY (IIT)
  - Engineered a **C codebase** to meticulously study **fluid-solid interactions** in a 2D environment, specialising in simulating **shockwave propagation** during **underwater tectonic plate movement**
  - Published articles in peer-reviewed journals

2022 - Present

### Machine Learning (Deep Learning / Artificial Intelligence)

- EINDHOVEN UNIVERSITY OF TECHNOLOGY
  - JM Burgercentrum course on "**Fluid problems using Machine Learning**"; solved test cases with different models using **PyTorch** on **Jupyter notebook** (Logistic Regression, MLP, CNN)
  - Completed assignment tasks based on **Kaggle**
  - Successfully tackled well-known machine learning challenges, including MNIST digits, IMDB movie review, Boston and California housing price datasets
  - Read and practiced books by **Aurélien Géron** and **François Chollet**

June 2015 - May 2016

### Industrial / Commercial Software (Batchelor project)

- HERITAGE INSTITUTE OF TECHNOLOGY
  - Modelled flow over a horizontal axis wind turbine blade of NACA aerofoils and analysed flow induced structural stress using **SolidWorks, Ansys Fluent** and **Ansys Mechanical**

## Education

2019 - 2024 **Ph.D., Applied Physics** (expected May 2024)
- EINDHOVEN UNIVERSITY OF TECHNOLOGY (TU/e), NETHERLANDS

2016 - 2018 **Masters in Technology, Mechanical Engineering**
- INDIAN INSTITUTE OF TECHNOLOGY (IIT) GUWAHATI, INDIA

2012 - 2016 **Bachelors in Technology, Mechanical Engineering**
- HERITAGE INSTITUTE OF TECHNOLOGY, KOLKATA, INDIA

## Competencies / Skills

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|---|---|
| **Programming Language** | C/C++ language, Python, Bash, Git, MATLAB, Mathematica |
| **Data analysis** | NumPy, pandas, MS Excel |
| **Machine Learning** | TensorFlow, PyTorch, Keras, scikit-learn, Neural Networks, CNN, Logistic Regression, Multi Layered Perceptron |
| **Data Visualisation** | Matplotlib, ParaView, Tecplot 360, gnuplot, Blender |
| **Design Software** | SolidWorks, AutoCAD |
| **Documenting/Editing** | LaTeX, Markdown, VS Code, Sublime, MS Office, Emacs |
| **Operating systems** | Linux, MacOS, Windows |

## Teaching and Presentation

- Delivered my research as talks/posters at multiple international conferences in Netherlands, USA and India (including **APS**, JMBC, DSFD, FMFP)
- Accumulated **300+** hours of teaching experience to Bachelor's and Master's students at Eindhoven University of Technology
- Conducted **100+** hours of teaching Fluid Mechanics for Master's and Bachelor's students at Indian Institute of Technology Guwahati, India
- Provided **100+** hours of teaching to underprivileged children in Guwahati, India

## Achievements

- Secured an All-India Rank of **1010** in the Graduate Aptitude Test in Engineering (**GATE**) out of **0.2 million** candidates
- Achieved an All-State Rank of 4038 in West Bengal Joint Entrance Exam (**WBJEE**) among **0.12 million** candidates
- Awarded a grant of **49 million** computational hours on Snellius as part of a 5-members group

## Publications

- **A. Ghosh**, A. Gabbana, H. Wijshoff, and F. Toschi, Effective Force Stabilising Technique for the Immersed Boundary Method, Communications in Computational Physics 33, 349–366 (2023) 🔗 link
- **A. Ghosh**, S. Majumber, G. Natarajan, and D. N. Basu, Comparative Study of Two Immersed Boundary Approaches in the Lattice Boltzmann Framework, Proceedings of the 7th International and 45th National Conference on Fluid Mechanics and Fluid Power (FMFP), (2018) 🔗 link
- S. Majumber, **A. Ghosh**, and D. N. Basu, and G. Natarajan, Re-examining the partially saturated-cells method for 🔗 link incompressible flows with stationary and moving bodies. Computers and Mathematics with Applications 110, 19-39 (2022)
- The list of publications can be found on 🔗 GoogleScholar/ArnabGhosh
- Contact information of referees can be provided upon request

## Language proficiency

- English (TOEFL 109)
- Bengali (native)
- Hindi (native)
- Dutch (A1)