PRANAV BAHL

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OBJECTIVE

To leverage my expertise and experience in scientific computing algorithm, software development for numerical simulations (computational physics & applied mathematics) and machine learning with a strong publication track record. Seeking a challenging position with leveraging my values pertaining to independent work ethics, leadership abilities, and effective communication skills. Dedicated to fostering collaborations and proposing innovative solutions while making a valuable contribution to the organization's success.

EDUCATION

MSc, Advanced Computational Methods for Aeronautics, Flow management and Fluid-Structure Interaction
Imperial College London, London, United Kingdom 2022 - 2023

Thesis: Quantum machine learning (QGRUs & QLSTMs) for high-dimensional chaotic dynamical systems.

Relevant Coursework:
Computational Fluid Dynamics, Turbulence and Turbulence Modelling, Computational Linear Algebra, Advanced Fluid Mechanics and Fluid Structure Interaction, Artificial Intelligence/Machine Learning, Flow Instability and Transition, and Systems Engineering.

Bachelor of Technology, Mechanical Engineering
Delhi Technological University, Delhi, India 2017 - 2021

Thesis: State-estimation via Deep Learning : A reduced order modelling approach

SKILLS

Programming :	Python (Optimized tensor libraries : PyTorch & Tensorflow), LATEX, C++
CFD/CAD Software :	ANSYS Fluent, STAR-CCM+, OpenFOAM, SolidWorks, Nektar++
Other Tools :	MATLAB, Microsoft Office

EXPERIENCE

Research Internship Mar 2021 - Oct 2021
Carnegie Mellon University *Pennsylvania, USA*

- Carried out 2D CFD simulations on OpenFOAM for various laminar and turbulent flow cases and validated the numerical results generated with the experimental data available from the literature.
- Conceptualized a 3D U-Net based convolutional architecture to preserve and evolve unsteady fluid dynamics which was bench-marked on five data sets. (Turbulent flow through a channel, Vortex Shedding and SST)

Summer Fellowship (SFRP-2020) Jun 2020 - Aug 2020
IIT Delhi *Delhi, India*

- Developed a state estimation architecture where real-time sequential sensor data is mapped to the ROM state space using Long Short-Term Memory based recurrent neural network to capture the temporal dynamics.
- Performed and validated CFD simulation for unsteady 2D laminar flow around circular cylinder at multiple Reynolds' number on OpenFOAM and post-processed dataset using MATLAB script, also extracted meteorological data (Sea Surface Temperature, Air Temp., Humidity etc.) from netCDF files using OPeNDAP.

Internship May 2019 - Jul 2019
Forbes Marshall, IIT Madras Research Park *Chennai, India*

- Implemented a numerical framework using OpenFOAM to model spray formation from a single hole fuel injector.

Unmanned Aerial Systems Nov 2018 - April 2020
Delhi Technological University *Delhi, India*

- Fabricated state-of-the-art, all-composite, Vertical Take Off and Landing Unmanned aerial vehicle with automatic tilt rotor mechanism using Vacuum Bagging process for HADR missions (Mehar Baba Prize competition).
- Improved the aerodynamic efficiency (Lift/Drag Ratio) of VTOL-UAV by introducing C-curve wing-lets by 10%, thereby enhancing the crashworthiness of the system. Developed a 3D CAD model of the UAV on Solidworks.
- Carried out 3D CFD Simulations using K-omega turbulence model to evaluate the Coefficient of lift and Coefficient of drag of the VTOL-UAV. Numerical experiments were performed on ANSYS Fluent and OpenFOAM.

JOURNAL PUBLICATIONS

Total Citations: 48 | Google Scholar Link

- Pant, Pranshu, Ruchit Doshi, **Pranav Bahl**, and Amir Barati Farimani. "Deep learning for reduced order modelling and efficient temporal evolution of fluid simulations." **Physics of Fluids** 33, no. 10 (2021): 107101.
- Kumar, Yash, **Pranav Bahl**, and Souvik Chakraborty. "State estimation with limited sensors–A deep learning based approach." **Journal of Computational Physics** 457 (2022): 111081.

IMPERIAL COLLEGE COURSEWORKS

- Implementation of second/fourth order accurate finite difference schemes for 2D Laplace Equation in **Python**.
- Implementation of a finite-difference **FORTRAN** code using Adams-Bashforth and Runge-Kutta numerical schemes for 2D compressible Navier-Stokes equations (Flow around cylinder) with periodic boundary conditions.
- Implementation of partial/complete pivoting LU factorization via **MATLAB** for discretized integral equations.
- Implementation of Unsupervised machine learning algorithms and supervised machine learning algorithms (Neural networks, Support vector machines, Convolutional Neural Networks, Recurrent Neural Networks & long short-term memory networks (LSTMs) via library **Tensorflow** in python) to various engineering problems.
- Carried out 2D/3D CFD simulations around airfoils via vortex lattice method (VLM), Reynolds-averaged Navier–Stokes (RANS) [Turbulence Models: Spallart allamaras, K-Omega SST, k-epsilon] and Spectral/hp Element Methods via softwares XFOIL, StarCCM+ and Nektar++ respectively.

ACHIEVEMENTS

- **IIT JEE Mains 2017:** Ranked in the top 1% among 1.5 million candidates appeared in JEE Mains 2017 (Joint Entrance Examination - All India Engineering Entrance Examination) .
- **Summer Fellowship:** Awarded SFRP 2020 (Summer Fellowship Research Program 2020) at IIT Delhi.
- **Physics of Fluids 2021:** **Article** was selected as one of the journal's best and got featured at Volume 33.
- **Mehar Baba Prize Phase II:** Qualified for the final phase of the competition after showcasing dynamic swarming of 10 UAVs in phase II and received a funding of 25 Lakh INR. University received a funding of amount 3 Crore INR by Adani group to participate in Phase III.

LEADERSHIP

- **Class Representative:** MSc, Aeronautics Department, Imperial College London

  Collecting feedback and communicating student concerns with the faculty at Aeronautics Department.
- **President:** American Society of Mechanical Engineers, DTU Chapter

  Organized E-Fest and various workshops on OpenFOAM.
- **Lead Engineer:** Unmanned Aerial Systems (UAS), DTU

  Spearheaded a multidisciplinary team of 25 members to develop indigenous UAVs for defense and commercial applications. Conducted test flights using exhaustive checklists ensuring rapid development of the final system.