CV - Tarun Singh

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PERSONAL STATEMENT

Recent PhD graduate in Fluid Mechanics with a focus on Aerodynamics and Machine Learning. Skilled in reinforcement learning, deep learning, and optimization techniques, with hands-on expertise in active flow control and Computational Fluid Dynamics (CFD). Passionate about applying interdisciplinary knowledge to solve complex engineering challenges. Actively seeking research opportunities that foster collaboration, innovation, and value continuous learning.

EDUCATION

PhD Fluid Mechanics: University of Poitiers, Poitiers, France (Dec 2020 - Dec 2024)

- **Thesis**: "*Active flow control using neuroevolution guided deep reinforcement learning (DRL)*".
- PhD advisors: Dr Laurent Cordier, Research Director, Institut Pprime; Prof Ronan Fablet, Lab-STICC.
- Major field: Fluid Mechanics. Secondary fields: Aerodynamics (Flow control), Machine Learning (DRL).
- Publication: "Active flow control using neuroevolution guided DRL: towards sample efficient and explorative policy search", Journal of Fluid Mechanics (submitted).

MSc Computational Fluid Dynamics: Cranfield University, England, UK (Sep 2018 - Oct 2019).

- **Modules**: Numerical Methods and High Performance Computing, Grid Generation / CAD, Data Analysis and Uncertainty, Turbulence Modelling, Numerical Modelling for Compressible/Incompressible flows, CFD for automotive applications, CFD for aerospace applications and rotating wings.
- **Thesis**: "*Multi-objective airfoil shape optimization for high speed flows using deep neural networks (DNNs)*". Advisor: Dr Antonios Antoniadis, Cranfield University.
- Grade obtained: Distinction (72.24%).

BTech Aerospace Engineering: University of Petroleum & Energy Studies, India (July 2012 - May 2016)

- **Modules**: Aerodynamics, Propulsion, Fluid Mechanics, Introduction to CFD, Aircraft Design, Aircraft Structures, Vibrational Analysis, Thermodynamics, Heat Transfer, Flight Mechanics, Spacecraft Dynamics and Attitude Control, Orbital Mechanics.
- **Group Project**: Effect of mass flow rate on Deflagration-Detonation Transition (DDT) using CFD analysis: Investigated the impact of varying fuel-air mixture mass flow rates on DDT in a pulse detonation engine.
- **Workshops**:
  - Flight Lab, Indian Institute of Technology, Kanpur: Calculated aircraft weight, C.G. shift, and evaluated performance of Cessna 182 H. Experienced flight dynamics modes like phugoid and Dutch roll, in flight.
  - R/C Gyrocopter workshop, Indian Institute of Technology, Bombay: Gained in-depth knowledge of gyrocopter aerodynamics and fabricated a functional R/C model, achieving successful flight.
- Grade obtained: 69%.
- Secured all India rank 234 in GATE – Aerospace Engineering exam (Feb 2017), translating to 96 percentile.

CAREER HISTORY

Institut Pprime (CNRS): Poitiers, France – Doctoral Researcher (Dec 2020 - Dec 2024)

- Awarded 3-year PhD funding by the French National Centre for Scientific Research (CNRS).
- Conference and workshop presentations:
  - 1st ERCOFTAC workshop on Machine Learning for Fluid Dynamics (ML4Fluids). Sorbonne University, Paris (March 2024).
  - 3rd international workshop on Artificial Intelligence and Augmented Engineering (AIAE'23). Pascal Institute, University of Paris-Saclay (Dec 2023).
  - 14th ERCOFTAC symposium on Engineering, Turbulence Modelling and Measurements (ETMM14). Barcelona, Spain (Sep 2023).

IBM: Gurugram, India – Systems Engineer (Nov 2017 – Aug 2018)

- Optimized and streamlined workflows for master data creation, maintenance, and approval processes, resulting in improved operational efficiency.
- Collaborated with cross-functional teams to design and implement data management solutions, ensuring alignment with client requirements.
- Awarded "Rising Star" award for exceptional performance as a graduate hire.

IBM: Bengaluru, India – Associate Systems Engineer (July 2016 – Oct 2017)

- Completed SAP SD functional training and certification, sponsored by IBM.
- Functional consultant (SAP) within the Master Data Management team of Arkema chemicals, France.

Aerial Delivery Research and Development Laboratory, DRDO: Agra, India – Research Intern (May 2015 – July 2015)

- Studying the effect of varying fabric porosity on aerodynamic characteristics of a parachute.

SKILLS

- **Technical skills:**
  Numerical simulation/analysis, Deep learning, Reinforcement learning ■■■■□
  Python, Tecplot, ANSYS-Fluent, Pointwise ■■■■□
  OpenFOAM, MATLAB, C++, PyTorch, STAR-CCM+, Tensorflow ■■■□□

- **Languages**:
  English (Fluent; IELTS Academic – CEFR Level: C1), **Hindi** (Native) ■■■■□
  French (Limited working proficiency) ■□□□□