

Vishal Singh

vishalsinghforcv@gmail.com
vsingh10_be21@thapar.edu
+91-7599738576

vsingh10.github.io
github.com/vsingh10
linkedin.com/in/vishal-singh10/
scholar.google.com/citations?user=AbC1234XYZ

EDUCATION

Thapar Institute of Engineering and Technology

Bachelor of Engineering, Mechanical Engineering

– Cumulative GPA : **8.98/10.0**

Patiala, Punjab

August 2021 – June 2025

EXPERIENCE

SciML Intern

NMCAD Lab, Indian Institute of Science

April 2025 – Present

Bengaluru, India

- Engaged in advanced research at the NMCAD Lab, focusing on the optimization of auxetic metamaterial structures, modeling of fatigue crack growth (FCG), and Industry 4.0 applications. Contributed to **3 journal publications** and **2 accepted conference papers**.

Machine Learning Intern

JuliaHub

January 2025 – March 2025

Bengaluru, India

- Reproduced core pipeline results (DataGeneration, Preprocessing, and DigitalEcho) from the JuliaSimSurrogates repository, and created detailed deployment documentation tailored for the GUI team, ensuring 100% understanding of the MTK model workflow for seamless integration.
- Implemented gradient testing in `Surrogate.jl`, streamlining testing workflows and reducing execution time from **3 hours to 1.5 hours**, enabling scalable training improvements while consistently meeting deadlines.

Samsung PRISM Intern (Remote)

Samsung R&D Institute

October 2024 – April 2025

Bengaluru, India

- Developing a video generation framework using diffusion models to generate 720p videos at 30 FPS with improved temporal consistency; mentored by researchers from Samsung's Visual Intelligence Team.

Undergraduate Research Assistant

Thapar Institute of Engineering and Technology and IITDM Kancheepuram

February 2024 – June 2025

Patiala, Punjab

- Conducting research in aerospace engineering, biomedical engineering, and computational solid mechanics.
- Applying advanced machine learning techniques including Physics-Informed Neural Networks (PINNs), Neural Operators, Kolmogorov-Arnold Networks (KANs), and Physics-Informed KANs (PI-KANs) for solving real-world problems.
- Contributed to projects focused on AI for science, healthcare, and social impact. Achievements include one published research paper, one under review, one accepted conference paper, and one patent application submitted.

MITACS Globalink Research Intern

École Polytechnique de Montréal (Fully Funded)

June 2024 – August 2024

Montreal, Canada

- Engineered a predictive method using Fourier Neural Operator, Physics-Informed Neural Operator, and DeepONet to approximate flow in porous media, with FNO achieving the highest accuracy of 89%.

Deep Learning Intern

SMICR Group, Indian Institute of Technology Delhi

June 2023 – June 2024

New Delhi, India

- **Project: Qualitative Prediction of Boundary Layer Thickness via Machine Learning**
- Implemented a **Fourier Neural Operator**-based model to predict boundary layer thickness over a T106A Low-Pressure Turbine blade across varying Mach numbers, achieving **91% accuracy**.
- Captured complex spatial dependencies in boundary layer data using Fourier transforms and deep learning techniques.
- Built conventional **ANN models** to predict skin friction, pressure coefficient, and boundary layer distribution along the blade surface.

TECHNICAL SKILLS

Languages: Python, Julia, MATLAB, \LaTeX , SQL

Frameworks: PyTorch, TensorFlow, Keras, OpenCV, Streamlit, MLflow, LangChain

Developer Tools: Git, VS Code, Google Colab, Jupyter Notebook, Docker

Libraries: Pandas, Numpy, Scikit-Learn, Matplotlib, Seaborn, Hugging Face, PySINDy

Softwares: PowerBI, Microsoft Excel, Creo Parametric, Ansys, AutoCAD

PROJECTS

- **Jupiter Chatbot: AI Assistant for Fintech Queries** [\[Live App\]](#)
 - Developed a context-aware AI chatbot using LangChain, FAISS, and llama-4-maverick, capable of answering user queries based on [Jupiter.Money](#)'s official content.
 - Developed an interactive Streamlit UI with memory-based conversations and brand-aligned prompt engineering.
- **Breast Cancer Prediction Web App** [\[Live App\]](#)
 - Developed a Streamlit web app for breast cancer classification using logistic regression (97% accuracy).
 - Integrated radar chart visualization and modular deployment using serialized model and scaler.
- **Semi-Autonomous Water Cleaning Robot [Final Year Capstone Project]** [\[Project Details\]](#)
 - Designed and fabricated a river-cleaning robot with ESP32 and BTS7960-based control system.
 - Conducted CAD modeling and ANSYS simulations to optimize fluid flow around the collector.
- **Fourier Neural Operator for Predicting Flow in Porous Media**
 - Generated synthetic flow simulations using the Lattice Boltzmann Method (15 GB dataset).
 - Trained a Fourier Neural Operator model to predict dynamic flow fields under varying conditions, achieving 89% accuracy.
- **Apple Stock Prediction Using Gaussian Process Regression**
 - Built a GPR-based time series model to forecast stock prices with uncertainty quantification.
 - Applied feature engineering and hyperparameter tuning for improved predictive performance.

PUBLICATIONS

- **Singh, V.**, Harursamath, D., Dhawan, S., Sahni, M., Saxena, S., Mallick, R. "Physics-Informed Neural Network for Solving a One-Dimensional Solid Mechanics Problem." *Modelling*, 2024, 5, 1532–1549.
<https://doi.org/10.3390/modelling5040080>
- Characterization and Detection of Structured False Data Injection in Reinforcement Learning-Controlled Artificial Pancreas Systems [**Submitted to IEEE Transactions on Industrial Informatics**]
- Neural Optimization Machine for Analytical Function Optimization: Application to Auxetic Metamaterial Design [**Submitted to Journal of Computational Science**]
- Neural Optimization of Anti-Tetrachiral Auxetic Metastructures for Advanced Engineering Applications [**Ongoing Manuscript**]

CONFERENCES

- Physics Informed Neural Network for Modelling Glucose-Insulin Dynamics for Type 1 Diabetes [**Presented at AICOMAS 2025, Paris 17–21 February 2025**]
- Physics-Enhanced Neural Network Approach for Optimizing Re-Entrant Auxetic Structures in Advanced Engineering Applications [**Accepted at MSML 2025, Naples, Italy, August 4–8, 2025**]
- An Artificial Intelligence-based Design Framework of Optimal Auxetic Metamaterial Structures [**Accepted at I4AM, Indian Institute of Science, Bengaluru, India, January 8–9, 2026**]
- Design and Development of Piezoelectric Auxetic Energy Harvesting Devices for Engineering Applications [**Accepted at I4AM, Indian Institute of Science, Bengaluru, India, January 8–9, 2026**]

PATENTS

- Pseudo-Artificial Pancreas: A Low-Cost AI-Based Insulin Dosage Recommendation System for Type 1 Diabetes [**Patent Filed**]

AWARDS AND ACHIEVEMENTS

- Awarded **Merit Scholarship III** for 2023–24 worth **INR 1,59,000** for securing a position in the **top 10%** of students in the Mechanical Engineering Department (MED), TIET.
- **MITACS Globalink Research Fellowship**: Received a fully funded summer research internship at École Polytechnique de Montréal, Canada (June–August 2024), valued at CAD \$9000.
- Awarded **Merit Scholarship III** for 2022–23 worth **INR 1,39,000** for achieving a position in the **top 10%** of departmental student strength at MED, TIET.
- Secured **3rd rank** in MED for academic performance in 2022–23; awarded a **certificate** and a cash prize of **INR 2,000**.