

# Deepak Kumar

Organization: Havells India Ltd.  
Senior AI/ML Engineer  
Indian Institute Of Technology Indore  
Current Location - Sector-11, Noida

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Project Portfolio  
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## SUMMARY

AI/ML Specialist with over 3 years of experience spanning deep learning research, generative AI solutions, and industrial applications in mechanical engineering. Proven track record in developing and deploying advanced machine learning models, including PINNs, PointNet, PointNet-Transformer, DeepSDF tailored to core engineering problems. Experienced in delivering GenAI/Agentic AI solutions with end-to-end ownership of model development, deployment, and MLOps. Brings a unique blend of academic rigor and practical execution across research labs, product development, and real-world industrial settings.

## EDUCATION

Degree/Certificate	Institute/Board	CGPA/Percentage	Year
MS(R) Mechanical Engg.	Indian Institute of Technology Indore	7.86	2024
BE Mechanical Engg.	Nagpur University	7.80	2018
Senior Secondary	BSEB Board	66.20%	2013
Secondary	BSEB Board	75.80%	2011

## EXPERIENCE

- **Center for Research & Innovation - Havells India Ltd.**  
*Senior AI/ML Engineer*

Sept. 2024 - Present

Noida, India

Project 1: ML-Based CAD-to-CFD Pipeline

Built a fully automated CAD-to-CFD prediction pipeline, integrating preprocessing, inference, and visualization. Leveraging architectures like PointNet and Physics-Informed Neural Networks (PINNs) to model 3D fluid dynamics. Interactive front-end to visualize flow predictions and download results, supporting real-time user interaction.

– End-to-end pipeline deployed on an NVIDIA server, optimized for high-performance inference and parallel model training. Organized large-scale simulation datasets using tools like DVC/LakeFS, ensuring traceability and reproducibility. Integrated MLflow/W&B for logging hyperparameters, metrics, model versions, and result comparisons.

– Implemented CI/CD pipelines using GitHub Actions/GitLab CI, enabling automatic testing, model packaging, and deployment. Built-in model drift detection, alerting, and automatic retraining modules using scheduled jobs. Ensured proper access control, audit logging, and environment provisioning for collaborative, scalable experimentation.

Project 2: Agentic AI Solution for Automated CAD Generation

– Developing an AI Agent using GenAI concepts to automate CAD model generation and validate it through CFD, thermal, and structural analysis. Built using LangChain, with components like custom data loaders, data splitters, multi-LLM orchestration, and RAG pipelines.

– Designed multiple conditional chains and integrated MLP-based decision modules for simulation-informed CAD generation. Developed an interactive frontend to process user queries, control parameters, and visualize/download CAD models.

– Enables early-stage New Product Development (NPD) by reducing iteration time through intelligent design and simulation validation.

• **Gas Turbine Research Establishment - DRDO**  
*Graduate Apprenticeship training*

Nov. 2018 - Nov. 2019

Bangalore, India

– Designed and optimized critical components for aircraft engines, demonstrating innovative and creative design in centrifugal compressors, volute casings., bearing housing, low-pressure filter, lay shaft, gears, bobbin, split flange, double eye flange, triangular flange/web, spacer, insert, elbow pipe, and over 300 parts for engine control systems.

– Led the KAVERI, STFE, and GHATAK Engine projects, highlighting strong teamwork and professional conduct. My adaptability and technical acumen were crucial in optimizing design, reducing project timelines by 17% while maintaining ethical standards. My communicative skills were vital in coordinating with cross-functional teams, ensuring seamless project execution and adherence to industry standards.

• **ISOPARA Engineering Service Pvt. Ltd.**  
*Design Engineer, GET*

May. 2018 - Nov. 2018

Pune, India

– Build 3D model of dies, and punches for Injection Moulding machines, facilitating the production of diverse products such as TV setup boxes, bottles, chairs, plastic handles, and various small objects, resulting in improved manufacturing efficiency and employing attentive detail to enhance product quality by 20%.

– Implemented Geometric Dimensioning and Tolerancing (GDT) principles to optimize design quality and manufacturability, resulting in a 28% reduction in production defects and a 15% increase in overall process efficiency.

## PROJECTS/RESEARCH WORK

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- **Fault Diagnosis of Centrifugal Pump using Machine Learning**

*MS Research, Aug. 2022 - July 2024*

*Dr. Pavan Kumar Kankar, IIT Indore*

- Led innovative research to classify blockages in centrifugal pumps, focusing on blockages up to 87.5% in suction and discharge lines, to improve predictive maintenance and reduce industrial downtime.
- 3D Modelling of an entire pump system for visualisation. Conducted thorough exploratory data analysis, plots, and heat-maps to understand the relationships between different statistical features and fluid dynamics in the pump.
- Utilized advanced signal processing techniques, such as FFT and PSD analysis, along with Continuous Wavelet Transform (CWT), to identify key frequencies and generate time-frequency signal representations, facilitating accurate blockage faults classification using Deep CNN methods.
- Made changes to the architecture of the InceptionV3 Network and got 95% accuracy, which is 13% better than the original pretrained InceptionV3 Model. This was done to classify 35 centrifugal pump blockage faults conditions, and published this research work in Advanced Engineering Informatics, a Q1 Journal with 8 Impact Factor (<https://doi.org/10.1016/j.aei.2025.103181>).

- **Design and Optimization of Vertical Axis Wind Turbine**

*BE, Aug. 2017 - Apr. 2018*

*Dr. Nitin K. Mandavgade, prof. Jayashri Lanjewar, Priyadarshini College of Engineering Nagpur*

- Applied cutting-edge CFD simulations to comprehensively analyze the vertical axis wind turbine's performance under various environmental conditions and wind speeds.
- Build a turbine system tailor-made for coastal areas, where a minimum elevation of 50 feet ensures optimal wind flow, thereby enabling homes to autonomously generate essential electrical energy.

## TECHNICAL SKILLS

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–**Programming - Tools/Skills:** Python, Pandas, Numpy, Matplotlib, plotly, seaborn, PINN, PointNet, Point cloud, k3D, ShapeNet, Llama, OpenAI, TF-IDF, statistical techniques(Decision Tree, Segmentation, Logistic and Multiple Regression), EDA, ML, Deep-Learning, AI agent, Agentic AI, HuggingFace, MLOps, Streamlit, Git, LLM, Langchain, LangGraph, ML flow, Pytorch, RAG, Vector Database, Chain, OpenCV, Tensorflow, Scikit-learn, Docker, SSH, Prompt Engineering, MySQL, Tableau, MATLAB, MS Office, ChatGPT, Cursor.

–**Mechanical - Tools/Skills:** Centrifugal Pump, Turbulent Flow, CFD, predictive analytics, Gas Turbine, Punch and Die Design, Product Design, Drafting, GD&T, BOM, Mechanical pipe routing, Part Assembly, Sheet Metal, Surface Modelling, Solid modelling, PLM, Solidwork, UGNX10, CATIAv5, Creo2.0, AutoCAD, TeamCenter, OpenFoam, ParaView.

## KEY COURSES TAKEN

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–**Major:** Theory Of Elasticity, Finite Element Method, Entrepreneurship

## POSITIONS OF RESPONSIBILITY

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– **Training and Placement Manager**, IIT Indore

*Mar. 2022 - Mar. 2024*

–Led a team to expand recruitment by strategizing company outreach, aligning with student aspirations, and employing innovative networking and training for enhanced placement results.

– **Acting General Secretary/Academic Council Member**, IIT Indore

*Apr. 2022 - Apr. 2024*

–Spearheaded event organization to enhance student exposure and master key skills such as public speaking, stage fear management, design thinking, etc through diverse competitions.