SUBHANKAR KULKARNI

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PROFESSIONAL SUMMARY

Mechanical Engineering student with strong expertise in manufacturing systems, machine learning, and data-driven engineering solutions, with two internationally published papers in Springer and IJISEM. Experienced in applying vibration analysis, signal processing, and mathematical modeling for fault detection and condition monitoring. Proficient in Python, MATLAB, and CAD tools, with hands-on experience developing integrated hardware-software engineering systems. Demonstrates strong problem-solving, project management, and teamwork skills, with a proven ability to deliver practical and innovative solutions.

EDUCATION

B.Tech., Mechanical Engineering — Kolhapur Institute of Technology (KIT) *2027*
CGPA: 8.4 / 10

Higher Secondary Certificate (12th) — Jaysingpur College, Jaysingpur *2023*
Percentage: 65.83%

Secondary School Certificate (10th) — Laxminarayan Malu High School, Jaysingpur *2021*
Percentage: 86.20%

PUBLISHED RESEARCH

Vibration and Time Based Feature Engineering for Comprehensive Gear Health *August 2026*
First Author (with P. D. Veer, Dr. J. S. Bhat, R. R. Bhosale, R. U. Gorgile, and S. S. Patil)

- Published in: *Interactions*, Vol. 247, Article 398 (Springer, 2026). DOI: https://doi.org/10.1007/s10751-026-02747-9
- Developed an edge computing architecture utilizing an ESP32 microcontroller, an MPU6050 vibration sensor, and an IR optical speed sensor to estimate Remaining Useful Life (RUL).
- Implemented a Random Forest machine learning model with a Blocked Time-Series 5-Fold Cross-Validation strategy, achieving a multi-class classification accuracy of 96.95%.
- Presented at the 3rd International Conference on Advanced Materials Manufacturing & Structures (ICAMMS 2026), Rajalakshmi Institute of Technology & University of Waikato.

AI-Assisted CNC Process Planning Using Computer Vision *June 2026*
Co-Author (with P. D. Veer, R. R. Bhosale, and R. U. Gorgile)

- Published in: International Journal of Innovations in Science Engineering and Management (IJISEM), Vol. 05, Issue 02 (ISSN: 2583-7117). DOI: https://doi.org/10.69968/ijisem.2026v5i2376-380
- Engineered a novel framework to fully automate CNC process planning directly from 2D part drawings.
- Utilized OpenCV for geometric feature extraction and applied Scikit-learn algorithms for automated, highly accurate tool selection, significantly reducing manual CNC programming time.

MANUSCRIPTS UNDER REVIEW

Optimization and Prediction of Tribological Behaviour Under Lubricated Sliding Conditions *Under Review*

- Executed experimental analysis using a Taguchi-based L27 orthogonal array design on a pin-on-disc tribometer, applying Grey Relational Analysis for multi-response optimization of friction and wear.

AI-Driven Predictive Thermal Management Framework for High-Performance GPU Architectures *Working Paper*

- Designed a physics-informed LSTM framework predicting junction temperatures 15 seconds in advance — reducing peak temperatures by 20% and cooling power consumption by 18.2%.

PROJECTS

Smart Gear Monitoring & RUL Prediction System (Oracles of Gears)

- Architected an IoT-based, real-time gear health monitoring and predictive maintenance hardware-software system with an integrated dashboard for early fault detection.

- Constructed a laboratory gear testing rig featuring a standard spur gear set driven by a Brushless DC motor to capture real-time mechanical degradation.
- Processed raw vibration signals via I2C at a 1 kHz sampling rate, applying a 5-point moving average for noise smoothing and Z-score normalization for clean data inputs.

LeafLens: AI-Powered Crop Health Diagnostic System

- Developed a real-time diagnostic platform for automated crop disease identification using advanced image processing.
- Engineered a smart advisory engine that delivers expert, actionable mitigation strategies, with confidence scoring for pathologies such as TYLCV and Septoria Leaf Spot.

EXPERIENCE — VIRTUAL INTERNSHIPS & INDUSTRIAL SIMULATIONS

Siemens: Manufacturing & Project Management *Dec 2025 – Feb 2026*

- Defined project scope and KPIs; calculated Estimate at Completion (EAC) to forecast financial outcomes and project costs.

Diageo: Process Optimization *Jan 2025 – Jan 2026*

- Evaluated distillation and maturation workflows to optimize spirit yield; identified bottlenecks in bottling lines to enhance throughput.

J.P. Morgan: Quantitative Research *Dec 2025*

- Modeled commodity storage contracts and performed credit risk analysis using FICO score evaluation.

Tata Group: Data Visualization *Jan 2025 – Dec 2025*

- Analyzed business scenarios to create data-driven visualizations and supported decision-making through analytical storytelling.

TECHNICAL SKILLS

Design & Analysis: CATIA V5, ANSYS Mechanical APDL, SolidWorks, Fusion 360, AutoCAD

Programming & Data: Python (NumPy, Pandas, Scikit-learn), MATLAB, OpenCV, Random Forest, Physics-Informed LSTM

Hardware & Embedded: ESP32, ESP8266, MPU6050 accelerometers, IR optical speed sensors, NI-9211 DAQ, K-type thermocouples

Core Engineering: Machine Learning, Predictive Maintenance, RUL Modeling, Vibration Analysis, Signal Processing, Fault Diagnosis, CNC Process Planning, Gear Dynamics, Metal Casting

Professional: Project Management, Technical Presentation, Communication, Teamwork

ACHIEVEMENTS & LEADERSHIP

- **Placement Coordinator, KIT** — Led industry-student relations, managing large-scale recruitment drives and corporate networking for the engineering department.
- Best Paper Presentation Award — International Conference on Advance Sustainability & Multidisciplinary Research, GM University (2025).
- Best Presenter Award — College of Engineering Pune (COEP).
- 1st Place Winner — KIT PBL Day (2025); 2nd Place — KIT PBL Day (2026).
- Certificate of Excellence — Volkswagen Group, i-Mobilothon Challenge (Team: Oracles of Gears).

CERTIFICATIONS

- Certified Ready Engineer — Tata Technologies (2026) | Mechanical Metal Casting — NPTEL (30+ hours)
- Fundamentals of Machine Learning & AI — AWS | MATLAB Onramp — MathWorks | Python Programming — LearnTube
- Data Visualization & Business Insights — Forage | Project Management — Oxford Home Study Centre
- +20 additional certifications in AI, CAD & Data Analytics

LANGUAGES

English (Fluent), Hindi (Fluent), Marathi (Fluent), German (A1 Level, In Progress)