Tharun Krishna

tharunkrishna1611@gmail.com | github.com/Tharun-bot | tharun-port.vercel.app | linkedin.com/in/tharun-krishna

Education

National Institute of Technology Karnataka — Surathkal, India
B.Tech in Mining Engineering — *07/2023 – 04/2027*

Indian Institute of Technology Madras — Chennai, India
BS in Data Science and Applications — *07/2023 – 04/2027*

Experience

ML Research Intern — 05/2026 – 07/2026
National Institute of Technology Karnataka — *Surathkal, India*

- Studied **blast-induced ground vibration (Peak Particle Velocity)** at an operational open-pit mine, analyzing field monitoring data against **blast design parameters** (charge per delay, distance, delay timing) to support safer, more efficient blast design
- Benchmarked machine-learning models against the classical **Holmberg–Persson empirical attenuation equation**, using exploratory data analysis and learning curves to validate model reliability on a limited field dataset

AI Research Intern — 01/2025 – 03/2025
Scalar Labs — *Surathkal, India*

- Designed a **real-time time series forecasting system** that converts streaming numerical data into **natural language embeddings** and predicts future values using **pretrained, frozen LLMs** (**PyTorch**, **Transformers**)
- Implemented **embedding alignment** techniques to bridge numerical and language-based representations, enabling efficient **next-K-step forecasting** without fine-tuning the base LLM

Machine Learning Engineer Intern — 05/2024 – 07/2024
Vaidsys Technologies — *Remote, India*

- Developed a **real-time anomaly detection pipeline** for streaming API and IoT sensor data, **cutting the false-positive alert rate by 35%** through feature engineering and adaptive threshold calibration
- Deployed **ML inference services on AWS EC2** with **Docker**, achieving **sub-100ms prediction latency** with **S3-backed model artifact versioning**

Projects

BlastPred – Directional Blast Vibration Prediction | *Python, XGBoost, scikit-learn, SHAP* | Github

- Built a **physics-informed ML pipeline** on **200 field blast-monitoring records** from an operational open-pit mine, independently predicting **Vertical, Longitudinal, and Transverse** ground vibration instead of a single resultant PPV, using features engineered from the **Holmberg–Persson attenuation relation** (scaled distance, log-transforms, charge-distance interactions)
- Fitted the classical **Holmberg–Persson empirical model** as baseline ($\mathbf{R^2 = 0.750}$) and improved on it with a **stacking ensemble** (XGBoost + SVR, Ridge meta-learner, Optuna-tuned), reaching $\mathbf{R^2 = 0.796}$–$\mathbf{0.819}$ and cutting **RMSE by 16–20%**
- Applied **Spearman correlation hypothesis testing** to demonstrate statistically significant **directional anisotropy** in blast vibration (p=0.004, p=0.013) and used **SHAP** to show each vibration direction is governed by different blast parameters
- Reconstructed resultant PPV from independently predicted components, **improving prediction accuracy by 4.14%** over direct prediction, and derived a **site-specific amplification factor correction table** (0.557–0.589) plus an interactive **Streamlit** tool for practical blast-design use

Technical Skills

Mining & Ground Vibration: Blast Design, Peak Particle Velocity (PPV) Analysis, Holmberg–Persson Attenuation Modeling, Ground Vibration Monitoring, Mine Safety Compliance
Data Analysis & ML: Python, XGBoost, scikit-learn, SHAP, Optuna, pandas, NumPy, Statistical Hypothesis Testing
Tools: Streamlit, Matplotlib, Jupyter, Git, SQL