

KATIKI REDDY THARUN

Biomedical Engineering Undergraduate · Founder, DiagnoSphere.X

Research Interests: AI for Healthcare · Biomedical Signal Processing · Medical Imaging · Explainable AI · Computational Healthcare

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PROFESSIONAL SUMMARY

Biomedical Engineering undergraduate and Founder of DiagnoSphere.X, working at the intersection of artificial intelligence, biomedical signal processing, and clinical engineering. Current research centres on computational frameworks for ECG and EEG intelligence, explainable and uncertainty-aware machine learning, and AI-assisted clinical decision support, translating data-driven methods into deployable healthcare technologies. Complemented by direct clinical engineering experience with critical-care instrumentation, providing an applied, systems-level understanding of clinical environments.

EDUCATION

B.Tech in Biomedical Engineering

Jul 2024 – May 2028

Vignan's Foundation for Science, Technology & Research

Vadlamudi, Guntur, India

- Relevant Coursework: Biomedical Signal Processing, Medical Imaging, Machine Learning, Biomedical Instrumentation, Digital Signal Processing.
- Affiliation: Vignan's Foundation for Science, Technology and Research (Deemed to be University), A+ NAAC Accredited.

RESEARCH EXPERIENCE

Undergraduate Researcher

Jul 2025 – Present

Vignan's Foundation for Science, Technology & Research

- Investigated computational methods for AI-assisted ECG and EEG interpretation, integrating signal-processing pipelines with explainable and uncertainty-aware machine learning models.
- Designed research prototypes combining classical signal-processing techniques (filtering, transform-domain analysis, morphological feature extraction) with modern classifiers to support clinically interpretable decision making.
- Evaluated model behaviour under uncertainty using confidence-estimation techniques, contributing to an ongoing framework for trustworthy medical AI intended for publication.

CLINICAL ENGINEERING EXPERIENCE

Biomedical Engineering Intern

Jun 2026 – Present

KIMS Hospital

- Supported maintenance, inspection, and operational troubleshooting of biomedical equipment across intensive care units, operation theatres, and critical-care environments.
- Worked directly with ventilators, ECG systems, infusion pumps, patient monitors, defibrillators, and incubators, developing applied instrumentation knowledge.
- Gained systems-level understanding of preventive maintenance strategies, equipment lifecycle management, and quality-assurance practices within clinical workflows.

RESEARCH PROJECTS

MED Quantum NIN — Uncertainty-Aware ECG Intelligence Framework

[Live Demo]

- Problem:** Clinical ECG classifiers are frequently deployed as black-box predictors with limited interpretability and no principled measure of predictive confidence.
- Methodology:** Extracted denoised, morphologically annotated beats via Pan-Tompkins algorithm, adaptive filtering, and discrete wavelet transforms; derived frequency features using FFT and STFT.
- Algorithms:** Benchmarked CNN, LSTM, and Transformer models against RF, Gradient Boosting, XGBoost, and SVM; quantified uncertainty via Bayesian Neural Networks and Monte Carlo Dropout.
- Engineering Contribution:** Built an inference pipeline exposing predictions, confidence intervals, and explanations (SHAP, LIME, Grad-CAM) through a FastAPI service. *Stack:* Python, PyTorch/TensorFlow, FastAPI.

EchoSphereX — Offline Biomedical Image Transmission

[Live Demo]

- **Problem:** Medical image transmission in low-resource or connectivity-limited settings is restricted by the absence of reliable network infrastructure.
- **Methodology:** Designed an acoustic communication framework using Slow-Scan Television (SSTV) and Multi-Frequency Shift Keying (MFSK) encoding with FFT-based demodulation.
- **Engineering Contribution:** Implemented adaptive filtering, Reed–Solomon error correction, and CRC-based integrity checking, demonstrating robust image recovery over noisy acoustic channels. *Stack: Python, DSP libraries.*

DiagnoSphere.X — AI-Powered Healthcare Intelligence Platform

[Live Demo]

- **Problem:** Patients and early-career clinicians lack accessible tools for interpreting complex clinical reports and health data.
- **Methodology:** Integrated medical NLP with large language models and retrieval-augmented generation (RAG) over structured clinical knowledge sources.
- **Engineering Contribution:** Architected a multi-agent AI backend with knowledge-graph retrieval and automated SOAP-note generation. *Stack: Python, FastAPI, Flutter, Firebase.*

TECHNICAL COMPETENCIES

Programming: Python, MATLAB

Artificial Intelligence: Machine Learning, Deep Learning, Explainable AI, Uncertainty Estimation, Healthcare AI

Biomedical Engineering: Biomedical Signal Processing (ECG/EEG, Wavelets, Pan–Tompkins), Medical Imaging, Clinical Instrumentation

Scientific Computing: MATLAB, COMSOL Multiphysics, LabVIEW, Blender (Scientific Visualization)

Software Engineering: FastAPI, Flutter, Firebase, REST APIs, Git, LaTeX, Jupyter

LEADERSHIP & OUTREACH

Founder & Workshop Organizer

Dec 2024 – Present

DiagnoSphere.X

- Direct a student-run HealthTech research initiative, managing multi-disciplinary prototype development and technical documentation.
- Designed and delivered STEM workshops in artificial intelligence, programming, and biomedical engineering for student audiences.

Community Health Awareness Coordinator

Jul 2025 – Jun 2026

National Service Scheme (NSS)

- Coordinated public health education and outreach programs in rural communities in collaboration with faculty and student teams (40+ hours).

PUBLICATIONS PROFESSIONAL LINKS

Publications: No formal publications yet; manuscript in preparation for uncertainty-aware ECG interpretation framework (MED Quantum NIN).

Profiles: [LinkedIn](#) | [DiagnoSphere.X](#) | [MED Quantum NIN](#) | [EchoSphereX](#)

Open to international undergraduate research internships, collaborative research, and interdisciplinary projects in AI, Biomedical Engineering, and Clinical Systems.