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Notice for the PhD Viva Voce Examination

Ms Amala Ann K A, Registration Number: 2170222, PhD Scholar at the Department of Statistics and Data Science, School of Sciences, CHRIST (Deemed to be University) will defend her PhD thesis at the public viva-voce examination on Friday, 10 April 2026 at 03.00 pm in Room No. 628, 6th Floor, R&D Block, CHRIST (Deemed to be University), Bengaluru - 560029, Karnataka, India.

Title of the Thesis	:	**An Intelligent Decision Support System for Parasomnia Detection Using Machine Learning Techniques**
Discipline	:	**Data Science**
External Examiner - I	:	**Dr Naveen N C** Professor Department of Computer Science and Engineering Ramaiah Institute of Technology MSR Nagar, MSRIT Post Bengaluru - 560054 Karnataka
External Examiner - II	:	**Dr Suganya Devi K** Associate Professor Department of Computer Science Engineering National Institute of Technology Silchar Masimpur, Silchar Assam - 788010
Supervisor	:	**Dr Vaidhehi V** Associate Professor Department of Computer Science School of Sciences CHRIST (Deemed to be University) Bengaluru - 560029 Karnataka

The members of the Research Advisory Committee of the Scholar, the faculty members of the Department and the School, interested experts and research scholars of all the branches of research are cordially invited to attend this open viva–voce examination.

Registrar (Academics)

Place: Bengaluru
Date: 06 April 2026

ABSTRACT

This research presents a multi-objective, EEG-based framework to advance the understanding and personalized management of sleep disorders using machine learning. The study is driven by three interconnected objectives: sleep signature discovery, neural plasticity estimation, and neurofeedback simulation each contributing to an adaptive and interpretable sleep analytics system. First, a Transformer–Graph Attention Network (GAT) model was developed to learn high-level EEG embeddings representing subject-specific sleep signatures. Graphs constructed using cosine similarity and refined through GAT attention captured both spectral similarity and disorder consistency, achieving a 92.4% accuracy and 0.92 F1-score, outperforming baseline PSD models. Second, contrastive learning using triplet loss quantified inter-night adaptability as a proxy for neural plasticity. Multi-night embeddings of 120 subjects were compared to derive plasticity scores, which correlated positively ($r = 0.92$) with delta power drop across NREM sleep, reflecting sleep-dependent synaptic recalibration. The model achieved 87% triplet accuracy, demonstrating robust subject-level representation learning. Finally, a Transformer-based neurofeedback simulator was developed to identify dysregulated EEG patterns using spectral power rules (e.g., excess alpha/beta in insomnia). Adaptive modulation of abnormal bands by 35% simulated electrophysiological normalization, improving regulation accuracy to 92% post-intervention. Overall, this integrative pipeline provides a scalable, data-driven approach to characterize sleep physiology, quantify brain adaptability, and simulate personalized neurofeedback bridging the gap between sleep analytics and precision therapeutics.

Keywords: *EEG, Sleep Disorders, Transformers, Paediatric Sleep Study, Polysomnography, Sleep Architecture*

Publications:

1. **Amala, K. A.**, Vaidehi, V., (2025). Personalized Sleep Signature: A Novel Approach To Unveil Paediatric Sleep Behaviour With Transformer Attention Mechanism And Graph Attention Networks. Journal Of Theoretical And Applied Information Technology, Vol.103(No.7). Https://Jatit.Org/Volumes/Vol103no7/33vol103no7.Pdf
2. **Amala, K. A.,** & Vaidhehi, N. (2025). Graph-Based Learning For Sleep Microarchitecture: A Hybrid Graph Autoencoder And Graph Attention Network Approach. International Journal Of Research In Medical Sciences, 13(11), 4696–4702. Https://Doi.Org/10.18203/2320-6012.Ijrms20253587