Indian Institute of Technology Delhi

School of Interdisciplinary Research (SIRe)

Project Proposal for Ph.D.

SIRe Project Number

2025-01-28

(will be assigned by SIRe)

Project Details	
Project Title	**Multimodal Clinical Assessment of Neurological Disorders Using Speech and Facial Behavioral Cues**
Project Summary	Current clinical assessment tools predominantly depend on manual observations and expert evaluation, which are often time-intensive, inherently subjective, and challenging to scale. While machine learning models, particularly deep learning approaches, have demonstrated potential in analyzing individual data modalities -- such as speech, video, or physiological signals -- they frequently exhibit limitations in multimodal integration and the generation of clinically actionable insights. Moreover, existing models face challenges related to interpretability and generalizability across diverse patient populations and clinical settings, restricting their translational applicability in real-world healthcare settings. To overcome these challenges, the proposed project aims to develop a multimodal AI framework powered by Large Language Models (LLMs) to analyze complex clinical data, including speech, video, and other behavioral signals. The framework will investigate how multimodal integration and LLM-based reasoning can enhance the accuracy, interpretability, and scalability of health monitoring systems. A key focus will be on the automated detection and longitudinal tracking of neurodevelopmental and neurological disorders, such as epilepsy and autism, by extracting behavioral and symptomatic patterns from naturalistic interaction data.

Ph.D. Supervisors

Role	Name of Faculty	Academic Unit in IITD/Institute/University	Email ID (Official)
Supervisor 1	Sahiinii L Veikho	HUSS (IIT Delhi)	sahiinii@iitd.ac.in
Supervisor 2	Suman Das	Physiology (AIIMS)	drsumandas@aiims.edu

Project requirements (Student qualifications, experience required, etc)
***The candidate will be shortlisted based on common shortlisting criteria decided by ScRC (SIRe)**

- B.E./B.Tech/M.Sc/ MCA or an equivalent degree in Computational Linguistics or Speech Science
- Candidates should have prior research experience, preferably in Machine Learning, Deep Learning, Speech Processing, or Large Language Models (LLMs). Experience in collaborative research projects is highly valued.

Source of fellowship/funding and project number

Institute Fellowship/ Project Fellowship /Part Time

Role of Faculty Members involved:	
Supervisor-1	The first supervisor is an expert in linguistics and speech processing in under resource language setting and will lead the development of speech-based feature extraction and analysis, ensuring that clinically relevant linguistic and prosodic markers are effectively captured and interpreted by the LLM framework.
Supervisor-2	The second supervisor specializes in clinical neurology and epilepsy research and will guide the integration and validation of clinical data, ensuring that the framework aligns with medical standards for the assessment and monitoring of neurodevelopmental and neurological disorders.