



Project Proposal for Ph.D.

Project Details (The research problem must clearly indicate the need for an interdisciplinary approach)

Project Title	Development of Large Language Model-Based Multimodal for Audio-Based Detection and Characterization of Tuberculosis
Project Summary (Minimum 500 and maximum 2000 characters)	Tuberculosis (TB) diagnosis requires accessible and scalable screening approaches, particularly in resource-limited settings. This project will investigate the use of Large Language Models (LLMs), audio foundation models, and advanced signal processing for automated TB detection from cough and respiratory sounds. The study will develop methods for extracting disease-related acoustic patterns, combining audio features with clinical and demographic information, and using LLM-based reasoning for classification and interpretation. The project will also explore multimodal learning and retrieval-augmented generation to incorporate medical knowledge and provide explainable, reliable, and clinically meaningful TB screening.

Ph.D. Supervisors
(Supervisor 1 and Supervisor 2 cannot be from the same department of IITD)

Role	Name of Faculty	Date of Superannuation (DD/MM/YYYY)	Academic Unit in IITD/Institute/University	Email ID (Official) & Contact Number
Supervisor 1	Anurag S. Rathore	June 2038	CHE	asrathore@biotechcmz.com
Supervisor 2	Tanmoy Chakraborty	January 31, 2053	EE	tanchak@ee.iitd.ac.in

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

Qualification:

- B. Tech. in Information Technology or Computer Science (1st division)
- GATE qualified in DA/CS

Experience required (Mandatory skills)

- Research experience in Large Language Models and Medical Image processing
- Have experience in web development

Source of fellowship/funding and project number
(CSIR/UGC/DBT/ICMR/ICAR/NEET-PG/DST-INSPIRE/IRD/FITT Project details, if any)

FT/11/84/2016

Role of Faculty Members involved:

Supervisor-1	Prof. Anurag. S. Rathore – Bioprocessing, Process modeling
Supervisor-2	Dr. Tanmoy Chakraborty – Natural Language Processing

- Note :-
- Approval from the respective DRC/CRC/ScRC of your Department/Centre/School will be required for using the "Institute Fellowship (Category-wise)" for selecting the students in SIRe.
 - Declaration:- Faculty members, please ensure that you have at least 3 years of service left before superannuation along with adequate sitting space & lab facilities for the SIRe student.
 - PI/s are also encouraged to submit joint proposals with AIIMS, NII, JNU and institutes with which IITD has an existing MoU. If the Co-PI (Supervisor 2) is from outside IITD, kindly share his/her detailed CV.
 - If a research scholar is to be considered for selection under the project fellowship, then the project should have a minimum of two-year duration remaining.
 - A candidate applying with a valid JRF/INSPIRE/any national level fellowships should have at least two-year validity from the date of joining of the Ph.D program.
 - The third supervisor name (if required) can be added only after the formation of Student Research Committee (SRC) subject to a strong recommendation of SRC and subsequent approval from the competent authority.
 - If Institute fellowship is being sought then DRC approval of the parent department of Supervisor 1 is required at the time of selection.