



Project Proposal for Ph.D.

Project Details	
Project Title	Developing an opensource molecular biology based genomic diagnostics stack for precision oncology for sensitive patient groups
Project Summary (Minimum 500 and maximum 2000 characters)	The role of genomics is well established in medical oncology to stratify patients for delivery of precise diagnostic interventions based on specific mutation profiles. Generating an accurate genomic mutation profile requires active participation of four disciplines - Molecular Biology, Bioinformatics, Pathology and Medical Oncology. Currently, no end-to-end integrated genomics solution exists that can be deployed in the Indian cancer clinics without being locked-in with proprietary service provider making this inflexible and expensive. Moreover, most of these solutions do not take into account the Indian genetic profile. This becomes extremely challenging when dealing with sensitive patient groups such as in the Armed forces and even other such organizations that wish to have an unhindered access to diagnostic resources. In this project we will develop a robust opensource genomics stack based on 2G and 3G sequencing platforms that is both Make-in-India and Made-for-Indians. As a case study, we will apply this stack at AIIMS to streamline study of lung cancer. This project consists of three objectives: 1. Developing a robust molecular biology platform to profile India-specific cancer mutations - Benchmarking available and in-house genomics assays for mutational profiling - Establishing accurate mutational identification for Indians using indigenous datasets. 2. Developing a cloud-based genomics solution for comprehensive & scalable reporting - Automation of updated genomic annotation - Deploying AI for diagnostic reporting 3. Dissecting mutational signature in a case study of familial Lung cancer patients using the above solution. - Generating the data using the optimized molecular biology platform - Performing analysis, annotation, and reporting using the cloud-solution - Identification of mutational signature for familial lung cancer

Ph.D. Supervisors			
Role	Name of Faculty	Academic Unit in IITD/Institute/University	Email ID (Official)
Supervisor 1	Dr. Ishaan Gupta	IITD	ishaan@iitd.ac.in
Supervisor 2	Dr.Prabhat Singh Malik	AIIMS Delhi	drprabhatsm@gmail.com

Project requirements (Student qualifications, experience required, etc) *The candidate will be shortlisted based on common shortlisting criteria decided by ScRC (SIRe)
• MBBS, MD Pathology affiliated working at not-for-profit Governmental Organization such as Armed forces (recommended) • The candidate should have NOC from parent institution for a study leave for pursuing the PhD full-time. • Atleast 3 years experience as a pathologist with at least 2 years of experience in handling cancer patient samples

Source of fellowship/funding (CSIR/UGC/DBT/ICMR/ICAR/NEET-PG/DST-INSPIRE/IRD/FITT Project details, if any)
Candidate with his/her own fellowship/ Institute Fellowship

Role of Faculty Members involved:	
Supervisor-1	Dr. Ishaan Gupta; Department of Biochemical Engineering and Biotechnology, IIT Delhi Role - Guiding genomics assay design, development and genomics data analysis.
Supervisor-2	Dr. Prabhat Singh Malik, Medical Oncology, AIIMS New Delhi Role - Guiding clinical profiling, patient recruitment, integrating genomics assays in clinical practise