The University of Queensland - IIT Delhi Academy of Research Joint PhD Project

PROJECT TITLE	**MICROFLUIDIC DEVICES FOR BIOMEDICAL APPLICATION**
PROJECT CODE	**UQIDAR 00165**
PROJECT DESCRIPTION	More than the cost per assay, it is the time taken to undertake a clinical diagnosis which is critical to patient survivability or comfort. For example, regular Kidney function test is a need for patients on dialysis. Those with chronic liver diseases (e.g. grade 3/4 Cirrhosis) need regular Liver function test. Conventional analysis uses Chemistry autoanalyzers and use reagent-based estimation requiring as much as 5 ml blood. The two PIs from QU and IITD who are working on similar areas of research met on the sidelines of UQUIDAR symposium and discussed the need for a simplified platform to solve these problems associated with clinical diagnosis. We decided to jointly work and complement each others expertise and enrol two Ph.D. students (I as well as A) who would work on development of robust microfluidic chips that can be used latter in point-of-care applications. The idea is to simplify fabrication strategy by using low cost PMMA or other suitable technology instead of conventional PDMS chips while incorporating array of biorecognition elements on chip to carry out complex analysis such as Kidney function test (BUN, Creatinine); or Liver function test (bilirubin, ALT, AST, ALP, GGT, Albumin, etc.) or, prediction of heart attack using multimarker analysis (CK, CK-MB, cardiac troponin, myoglobin, etc.). In Indian perspective, differentiation of Fever type (Dengue, Malaria, Chikungunya, Influenza, Pneumonia, Typhoid, Meningitis) using single chip (antibody/aptamer-based affinity biosensing) can be a game changer, but a challenging work to undertake. From Australian PI's perspective, counting of circulating tumor cell on microfluidic device can also be challenging but meaningful venture. Therefore, in this collaborative work, the students will be enrolled and trained on the aspects like microfabrication, immobilization and stabilization of biorecognition elements on chip, biosensing with suitable transducers and finally clinical validation at AIIMS (IITD PI has dual affiliation with AIIMS). The exact research problems amongst those cited above shall be arrived at in accordance to the training level of student, and their research choice in their interaction with SRC.
PROJECT OUTCOMES	Point of care device(s) for clinical diagnosis, which can be moulded to suit different needs. Once the basic platform is created, it can be modified to suit detection of different variables. e.g. chip to carry out liver function test can be modified by replacing biorecognition elements and be used in Kidney function test as well (with fresh-biosensor calibrations).
ADVISORY TEAM	**Professor Matt Trau** www.aibn.uq.edu.au/matt-trau m.trau@uq.edu.au Australian Institute for Bioengineering and Nanotechnology (AIBN) The University of Queensland **Dr Sandeep K. Jha** www.sandeepjha.com sandeepjha@iitd.ac.in Department of Biomedical Engineering Indian Institute of Technology Delhi
TYPE OF STUDENT	Applications are open to i students who meet eligibility criteria.

DISCIPLINE BACKGROUND OF STUDENT	Ideally, this project requires students with a background in biotechnology, analytical, microfabrication, nanotechnology.
IDEAL CANDIDATE	Essential capabilities: • Chemistry/ Biochemistry/ Biotechnology/ Nanotechnology/ Biomedical Engineering Desirable capabilities: • Microfabrication, Immobilization, Enzyme assay, Biosensing, Microfluidics Expected qualifications (Courses, degrees, etc.): • M.Tech./ M.S./ M.S.R/ M.Sc. in Chemistry/ Biochemistry/ Biotechnology/ Nanotechnology/ Biomedical Engineering
APPLICATION PROCESS	Apply online by the due date: https://www.uqidar.org/students/how-to-apply/