|  |  |
| --- | --- |
| Report for International Internship |  |
| Student Name: | SAMIRAN SAHU |
| Program Name: | NTU- India Connect |
| University: | Nanyang Technological University, Singapore |
| Department: | School of Chemical and Biomedical Engineering |
| Project Topic: | Photoacoustic imaging |
| IITKGP Dept./School/Center and Degree Program: | School of Medical Science and Technology (SMST)  Masters in Medical Science and Technology (MMST) |
| Duration of Internship: | 08-05-2019 to 12-07-2019 |
| Supervisor Name: | MANOJIT PRAMANIK |

**PROJECT DETAILS, OUTCOMES AND SUMMARY (3-4 BULLET POINTS OF WHAT YOU LEARNED AND HOW IT IS GOING TO APPLY TO REAL LIFE):**

* During the last 2 months, I assisted in the work carried out based on the photoacoustic tomography (PAT) system, a hybrid imaging system using lasers and ultrasound modalities. We tried to venture the potential clinical applications possible and tried experimentation on the rat models.
* Firstly, we tried rat brain imaging and reconstruction of the images using different algorithms. We tried assessing the cerebral blood flow measurements from the images especially taking into consideration the sagittal and the transverse venous sinus, as well as the capability of our system in rapid and successful detection of the blood flow changes which occurs in many clinical scenarios and requires to be monitored as till now the mode of evaluation is using MRI, which is much more expensive and time consuming. Assessment of morphological changes of cerebral venous sinus is important for physicians and radiologists to diagnose conditions like intracranial hypotension caused by CSF leak from lumbar puncture, dural weakness, following surgery, trauma or stenting for hydrocephalus etc as well as cerebral hypertension from severe head injury, stroke, brain abscess, subdural haematoma, brain tumour, meningitis, encephalitis, hydrocephalus etc. In this study, we examined the morphological changes of sagittal sinus due to blood flow changes in the rat brain induced by cerebrospinal fluid (CSF) extraction using low cost and high repetition rate (kHz) pulsed laser diode (PLD) based desktop photoacoustic tomography (PAT) system. Our results indicate that the desktop PLD-PAT system can be employed to evaluate the changes in the sagittal venous sinus. In our pre-clinical model, we found around 22% average increase in the blood flow. We will be publishing our results for this experiment soon. So, this system can be used for clinical diagnosis as well as drug effect monitoring in real life.
* Also, we tried to create the ischemic stroke model in rat using the MCA occlusion method and thromboembolic clot model using thrombin for inducing coagulation with subsequent imaging (PAT). We haven’t been able to get significant changes either in imaging or clinical signs in rat after our experimentation so further experimentation is required. Overall, I learnt about the PAT as well as PAM (Photoacoustic microscopy) systems and their advantages as well as technical limitations.

**OTHER ACTIVITES:**

* Attended the IIT Alumni Association, Singapore Students Alumni Meet 2019 on 22nd June 2019 at Marina Barrage, Singapore.
* Participated in ‘Missing Maps Mapathon’ organised by Doctors Without Borders/Médecins Sans Frontières (MSF) and WeWork on 6th July 2019 at Suntec Tower.
* Attended Nobel Laureate Public Lectures @ Nanyang Auditorium, NTU organised by Materials Research Society, Singapore in conjunction with ICMAT 2019