MASTER'S THESIS ABSTRACT – Kathiresan Chandrasekaran

Prostate cancer is the fourth most common cancer overall and the second most commonly occurring cancer in men. A radical prostatectomy is a popular surgical procedure for removing the entire prostate cancer tissue from the body. During the procedure, a pathologist is required to perform rapid microscopic analysis on the surgically removed tissue to confirm the "resection margin" (that is, the margin of non-tumorous tissue around a surgically removed tumor), increasing the time and cost of the surgery. We aim to develop a compact hybrid intra-operative sample analyzer system using Single Photon Emission Computed Tomography (SPECT) and Fluorescence Imaging to confirm the resection margin with precision, without the need for a pathologist. This master's thesis will cover elements such as design, prototyping, 3D reconstruction, and registration of both modalities, culminating in testing the developed system with phantoms containing SPECT and Fluorescent contrast agent.