

Integrated Ultrasound and Near-Infrared Diffuse Optical Imaging Probe

Status: Available

Group Members:

Sponsor(s):

Supervisor(s): Farid Golnaraghi, PhD, PEng, Professor/Director, Mechatronic Systems Engineering
Ramani Ramaseshan, PhD, MCCPM, Adjunct Professor, Head of Medical Physics, BC Cancer Abbotsford

Project Description:

1 in 8 women are expected to develop breast cancer during their lifetime. That means an estimated 26,300 women are diagnosed with breast cancer in Canada per year, and approximately 5,000 will die of it. While ultrasound imaging plays an important role in the screening+diagnosis of breast cancer, it would be improved with functional imaging targeted to the characteristics of tumour formation, such as local changes in blood oxygen concentration.

The team will come up with a probe design and prototype which incorporates ultrasound (US) imaging and near-infrared (NIR) diffuse optical imaging (DOI) in one hand-held probe. Having one probe means the two modalities are coregistered and the superior spatial imaging of US can be meaningfully enhanced with the functional imaging provided by DOI. The emphasis of this project is on the hardware+software to run it, with a lesser emphasis on design of an optimal algorithm for image combination.

While there is already a functional DOI probe created at SFU, which the team is more than welcome to use as a launching-point for further work, the team is free to be creative in determining the optimal combination of NIR light sources and detectors + ultrasound source and detectors. However, complexity, and thus cost, are often barriers to the widespread deployment of useful new medical devices to developing areas around the globe that would most benefit from their availability, so this should be kept in mind.

Main deliverables:

- x A hand-held probe that provides imaging of breast tumours with information combined from US and NIR DOI