



Software and GUI for a gamma camera for intra-operative functional imaging

General Info

Project Title: **Software and GUI for a gamma camera for intra-operative functional imaging**

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Project Abstract

Software and GUI for a hand held mini gamma camera designed for 2D functional imaging in the operating room will be developed. C++ and Qt are used to control the camera and display the results. Additionally, spatial resolution and sensitivity measurements can be carried out on a phantom.

Background and Motivation

Cancer is a frequent disease with a high mortality rate. The main goal is to detect it in earlier stages and prevent it from spreading (metastasis) to improve probability of cure. Radionuclide imaging is one of the most important applications of radioactivity in nuclear medicine and it is performed in almost every hospital in the first world and developing countries. Its purpose is to obtain a picture of the distribution of a radioactively labeled substance within the human body after it has been administered to the patient. Therefore the radioactive radiation emitted from within the patient is registered with external radiation detectors placed at different locations around the patient. Using this technique, functional images can be obtained to help the medical doctor in making decisions on the treatment of the patient and to guide him or her during surgery.

Currently gamma cameras are bulky and only used pre-operatively or mounted onto a holder to obtain 2D planar images. Using this novel hand held mini gamma camera, intra-operative 2D (and later 3D) images can be generated to improve surgery in cancer patients.

The camera interface, the calibration and knowledge about the detection characteristics are crucial parts for integrating this device into the surgical workflow.

Student's Tasks Description

The student should improve and extend a C++ interface to read out the mini gamma camera. Furthermore the images should be displayed, preferably using Qt, and basic calculations and evaluations should be performed, especially a calibration and homogeneity correction. The homogeneity correction is a matrix that accounts for the different sensitivities of the camera pixels, the calibration secures that the energies detected are correct. In addition, some phantom scans and pre-operative scans on humans can be performed.

He or she will be involved in application-driven clinical development in a multi-disciplinary team and get in touch with clinicians. Furthermore programming and team skills will be improved. The knowledge acquired will be a good basis for starting a Bachelor or Master thesis in our group.

Technical Prerequisites

Technical knowledge the student should have is programming skills in C++. A current driver exists for Windows, but a platform-independent solution would be great. Experiences in working with Qt or



even with hardware communication protocols

Administrative Info

Working Time: 150 hours

Project Location: IFL @ Klinikum Rechts der Isar

Required Equipments: Gamma camera (provided), radioactivity (provided), API to read out camera (provided but has to be improved), computer (student's one or provided)

Timeline and Milestones

Kick-off: April 23, 2012

Gamma camera interface working: May 21, 2012 (4w)

Image display working: June 11, 2012 (3w)

would be beneficial but not necessary.

Calibration measurements and storage of calibration matrix: June 25, 2012 (2w)

Additional experiments and evaluation: July 16, 2012 (3w)

Final presentation: July 20, 2012 (end of semester)

References

[1]: Wendler et al., First demonstration of 3-d lymphatic mapping in breast cancer using freehand SPECT. *Eur J Nucl Med Mol Imaging*, 37(8):1452–61, 2010.

[2]: Vermeeren et al., A Portable g-Camera for Intraoperative Detection of Sentinel Nodes in the Head and Neck Region. *The Journal of Nuclear Medicine*, 51(5):700-703, 2010.