UNIKLINIK RWTH AACHEN

LfB Lehrstuhl für Bildverarbeitung | RWTH AACHEN UNIVERSITY

Hyperion Hybrid Imaging Systems

Our research focus is on exploring the physical limits of current and future molecular imaging technologies. These areas range from simulations of new detector concepts, hardware prototypes, high-speed data processing, image reconstruction algorithms and applications using our research imaging prototypes. Our group consists of students and researchers from different disciplines: physics, engineering, computer science and medicine. We are a group with international network and close links to industry and RWTH spin-offs.

PhD Position for PET Data Analysis, Calibration and Characterization

As part of the HD-MetaPET and S-PET project (BMBF), we are developing and integrating a PET (Fig. 1) insert for our research chair's existing 1.5T MRI system. In the exciting upcoming project phase, we will complete the integration of our newly designed PET electronics within the MRI. Machine-learning and statistical methods are applied to extract from the data generated by the PET detectors the information about the gamma interacting with the scintillator. The energy, time and location are the parameters needed in order to reconstruct the image of the tracer distribution in a patient.

The candidate will work on the data processing, the calibration and evaluation of the PET detectors and the fully assembled system. Our chair has demonstrated significant expertise in PET-MRI system integration, with a proven record of adapting each installation to meet specific research requirements.

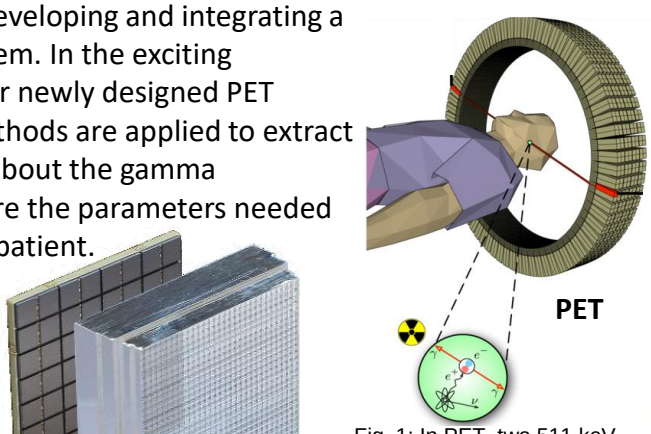

Fig. 1: In PET, two 511 keV gamma photons from a positron-electron annihilation have to be detected and correlated.

Key Responsibilities:

- Investigation of the detector calibration procedure. This can be done in a calibration setup or within the assembled system itself by using gamma sources with known interaction locations in the detector. The calibration environment is typically implemented in Python.
- Development of real-time capable data processing techniques to derive energy, time and location from the detector raw data by applying the calibration data acquired. The high-performance processing software is implemented in C/C++
- Evaluation of the detector and system performance.
- Investigation of the performance during simultaneous MRI image acquisition.

Candidate Profile:

- Strong affinity for data analysis and machine-learning.
- Programming experience in Python and C/C++ are of benefit.
- Ability to work effectively in a multidisciplinary team.

What We Offer:

- Opportunity to contribute to cutting-edge research in medical imaging and develop expertise in PET/MRI.
- Access to a fully equipped 1.5T MRI system for research purposes.
- An excellent collaborative and innovative working environment with experienced researchers.

More information on the project and the PET platform can be found on the websites of LfB and Hyperion.

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SPONSORED BY THE Federal Ministry of Education and Research

Sponsored by the Federal Ministry of Education and Research, contract numbers 13GW0609B & 13GW06218