



The Yale PET Center
presents

PET Talks

*Seminars By and For
PET Users*

“Markerless 3D Head Tracking for Motion Correction in PET Brain Imaging”

Oline Vinter Olesen

Technical University of Denmark

Tuesday, February 14, 2012

Boyer Center BCMM 206/208



Abstract. The purpose of this project is to improve motion correction in position emission tomography (PET) brain imaging through development of markerless tracking. Currently, motion correction strategies are based on either the PET data themselves or tracking devices relying on markers. Data-driven motion correction may be problematic due to physiological dynamics of the tracer and image noise. Marker-based tracking is potentially unreliable, and is hard to completely validate. The motion estimation is essential for proper motion correction of the PET images.

The evolution of a markerless custom-made structured light 3D surface tracking system will be presented. Our system is targeted at state-of-the-art high resolution dedicated brain PET scanners with a resolution of a few millimeters. State-of-the-art hardware and software solutions are integrated into an operational device. This novel system was tested against a commercial tracking system popular in PET brain imaging. Testing and demonstrations were carried out in clinical settings.

A compact markerless tracking system was developed with accuracy sufficient for PET imaging (i.e., < 0.1 degrees and < 0.3 mm). The first non-visible structured light system using Pico DLP technology was used. In a proof-of-principle study with two human PET scans, the system was demonstrated to improve PET image quality significantly over no motion correction. The results were similar to motion correction using an integrated commercial marker-based system. Furthermore, phantom studies were performed supporting the system's abilities for PET motion correction.