Contribution ID: **241** Type: **Poster presentation**

Feasibility of software-based real-time calibration of multi-gigabit PET data

Tuesday, June 7, 2016 3:00 PM (1h 30m)

Title:
Feasibility of software-based real-time calibration of multi-gigabit PET data
Abstract:
Positron Emission Tomography (PET) imaging of the breast has the potential to play a role in the detection, diagnosis, staging, guiding surgical resection, and monitoring of therapy for breast cancer. Of these potential roles, producing images at near or real-time is especially important to guide surgical resection and biopsy. This task becomes more difficult in systems with large numbers of detectors and channels. We are constructing a two-panel clinical PET system dedicated to imaging the breast that has 294,912 LYSO crystals read out by 4608 Position-Sensitive Avalanche Photodiodes (PSAPD). The system will read out data using UDP over six gigabit ethernet ports with a maximum predicted data rate of 456MBps for clinical settings. We discuss software considerations for receiving data since UDP does not guarantee transmission. We see a consistent loss greater than 20% when using the Linux networking stack. Using the packet capture library libpcap removes this baseline loss. We implement a dual-threaded design for receiving then processing raw data from the system. This model shows 0.037±0.004% data loss at 240MBps. This rate is the maximum for the current two gigabit ethernet cable setup. We extend and test data loss of the dual-threaded model by adding additional processing of raw data in the second thread. The processing of raw data produces calibrated data with an accurate timestamp, energy, and position in real-time. We show negligible (< 0.0001%) loss at or below 60MBps. There, however, is a steady increase in loss with increasing data rate up to 45.9±0.6% loss at 240MBps. We conclude, that barring upgrades to our current data acquisition computer, we need to produce calibrated data from saved raw data after the scan, which can be done quickly without the constraint of minimizing data loss.

Primary author: Mr FREESE, David (Stanford University Department of Electrical Engineering)

Co-authors: Dr LEVIN, Craig (Stanford University Departments of Radiology, Bioengineering, Electrical Engineering, and Physics); Mr HSU, David (Stanford University Department of Electrical Engineering); Mr INNES, Derek (Stanford University Department of Radiology)

Presenter: Mr FREESE, David (Stanford University Department of Electrical Engineering)

Session Classification: Poster session 1