Abstract
The authors are developing the X-ray imaging system by using a Silicon-On-Insulator (SOI) technology. This system consists of the integration type SOI pixel detectors, named INTPX4, and the DAQ system based on the multi purpose readout board, named SEABAS2 (Soi EvAluation BoArd with Sitcp). As in the past, the parallel readout have been already implemented to INTPX4 and it realized speedup. However, the total throughput of the DAQ system became the new bottleneck. In order to solve this problem, the parallel processing (data taking process and data storing process) and FIFO buffer were implemented for DAQ software. In result, DAQ throughput was increased to 90Hz (613Mbps) from 8Hz (41Mbps). The authors tried to apply this new DAQ for the X-ray imaging at KEK photon factory. First X-ray imaging was tested at PF BL-14C (33.3keV mono X-ray), integrated still X-ray images of small samples (dried anchovy, red pepper, electrical parts) were taken. Second time was tested at PF BL-14B (9.3keV mono X-ray), integrated still X-ray images for 3D (3-dimensional) CT (Computed Tomography) of dried anchovy were taken. Sample was taken every 1 degree rotating, total 181 times. These images were reconstructed as the high resolution 3D CT data. The detail of these X-ray tests will be shown in presentation.

Background and Purpose
We separate data taking process and other processes, and maximize data transfer rate.

Approach for DAQ Speed-up
Thus, We separate data taking process and other processes.

X-ray Imaging
This X-ray image taken by New DAQ with INTPX4(NFZ,500um). Source : 33.3keV mono-X-ray. Integration Time : 4ms x 1000frames Scan Time : 320ns/pix Bias Voltage : 150V Frame rate : 65Hz Combined 5 Images. Sample : Dried Anchovy

Implementation of Multi Thread Processing

Conclusion
• Developed DAQ firmware & software for high-speed readout.
• Implemtent Multi Thread Processing for DAQ software.
• New DAQ can high-speed data taking. (~90Hz, 94% of maximum in X-ray Imaging)
• We confirmed new DAQ can take data correctly.
• We could reconstruct high-resolution 3D CT image of Dried Anchovy.

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5 Images.
Sample : Dried Anchovy

Trouble of existing DAQ system

New DAQ Software
• MT functions is implemented.
• Refine inside structure.
• Using Qt 5.5, OpenCV3.00, picojson, MSVC++(Win).
• Working on Windows Vista, 7, 8, 8.1, 10. (Linux will be supported soon.)