

AbstractID: 10718 Title: Control, Acquisition, Processing, and Image Display System (CAPIDS) for the Solid-State X-Ray Image Intensifier (SSXII)

Purpose: A new control, acquisition, processing, and image display system (CAPIDS) for the Solid-State X-Ray Image Intensifier (SSXII) was developed and implemented using Laboratory Virtual Instrumentation Engineering Workbench (LabVIEW).

Method and Materials: The SSXII is an EMCCD-based x-ray detector that was designed to satisfy the high-resolution and real-time needs of neurovascular imaging. The SSXII includes a CsI(Tl) scintillator and a fiber-optic taper (FOT) coupled to an EMCCD camera with fiber-optic input window. The SSXII can be mounted on and used with a clinical fluoroscopic c-arm unit (Toshiba Infinix). The new CAPIDS provides controls for several radiographic imaging modes including: fluoroscopy, roadmapping, radiography, and digital-subtraction-angiography (DSA). Complete functionality of the SSXII is also provided in research mode, including the ability to modify the detector-element binning, exposure time, video gain, and electron-multiplying gain of the camera. A camera control-panel window can be accessed using a keyboard shortcut; this window shows the status parameters of the camera and allows control for all functions. Status words are saved to a text file for reference by the system control program.

Results: The CAPIDS provides a user-friendly interface that allows control of several clinical radiographic imaging modes using the SSXII including: fluoroscopy, roadmapping, radiographic mode, and DSA. Examples of each mode will be demonstrated. Additional features, including recursive filtering, contrast enhancement, patient registry and image archival have been implemented and should facilitate the clinical use of the new EMCCD-based detector system.

Conclusion: The control, acquisition, and display capabilities along with the electron multiplication gain (1-2000x), high-resolution, high-sensitivity and real-time imaging capabilities of the SSXII should provide angiographers and interventionalists with an improved ability to visualize details of small vessels and endovascular devices (such as stents), making diagnoses and image-guided interventions more accurate.

(Research partially supported by: NIH Grants R01-EB008425, R01-EB002873)