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2.2.4.1. Thermal Noise 2.2.4.2. Flicker Noise; 2.2.4.3. Noise in PPS Pixels; 2.3. Recent Developments; 2.3.1. Current Mode Active Pixel Sensor; 2.3.1.1. Linearity; 2.3.1.2. Gain; 2.3.2. Application to Emerging Diagnostic Medical X-Ray Imaging Modalities; 2.3.2.1. Dual-Mode Radiography/Fluoroscopy (R/F); 2.3.2.2. 3D Mammography Tomosynthesis; References; 3 Circuits for Digital X-Ray Imaging: Counting and Integration; 3.1. Introduction; 3.1.1. Image Formation; 3.1.2. X-Ray Detectors; 3.1.2.1. Indirect Detectors; 3.1.2.2. Direct Detectors; 3.1.2.3. Hybrid Pixel Detectors 3.1.2.4. Readout Concepts for Hybrid Pixel Detectors 3.2. Circuit Implementation; 3.2.1. The Photon Counter; 3.2.2. The Integrator; 3.2.3. The Feedback Circuit; 3.2.3.1. Feedback and Signal Duplication; 3.2.3.2. Static Leakage Current Compensation; 3.2.3.3. Sampling; 3.3. Experimental Results; 3.3.1. Photon Counter Measurements; 3.3.1.1. Dynamic Range; 3.3.1.2. Electronic Noise; 3.3.1.3. Noise Count Rate; 3.3.2. Integrator Measurements; 3.3.2.1. Dynamic Range; 3.3.2.2. Noise Performance; 3.3.3. Simultaneous Photon Counting and Integration; 3.3.3.1. Total Dynamic Range 3.3.3.2. Pulse Size Reconstruction 3.3.3.3. Spectral Resolution; 3.3.3.4. Spectral Hardening; 3.4. Conclusion; References; 4 Noise Coupling in Digital X-Ray Imaging; 4.1. Characterization of Noise Problems in Detector Systems; 4.2. Noise Mechanisms in Readout Electronics; 4.2.1. Noise Models; 4.2.1.1. Capacitive Coupling; 4.2.1.2. Impact Ionization; 4.2.2. Physical Properties; 4.2.2.1. Power Distribution Networks; 4.2.2.2. Substrates; 4.3. Simulation Models in Various Design Levels; 4.4. Readout Electronics Noise Coupling in Digital X-Ray Systems 4.4.1. Noise Coupling Effects on the Design Example System

Sommario/riassunto

A must-read for anyone working in electronics in the healthcare sector This one-of-a-kind book addresses state-of-the-art integrated circuit design in the context of medical imaging of the human body. It explores new opportunities in ultrasound, computed tomography (CT), magnetic resonance imaging (MRI), nuclear medicine (PET, SPECT), emerging detector technologies, circuit design techniques, new materials, and innovative system approaches. Divided into four clear parts and with contributions from a panel of international experts, Medical Imaging systematically covers: X-ray imag
