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Assessing the Requirements of a Computer-Based PET Coincidence Engine Using a Cluster of 60 Raspberry Pi

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In current PET scanners, coincidence finding is often performed inside FPGAs because of their high parallelization capacities. Nowadays, the trend in PET is to multiply the number of individual detection channels, and thus the FPGAs dedicated to the coincidence engine need to be increasingly powerful. However, FPGAs have a limited number of I/O ports, and their cost becomes prohibitive for the largest devices. This paper attempts to determine the scale of real-time computational resources needed for a computer-based coincidence engine dedicated to a LabPET II-based Ultra-High-Resolution (UHR) PET scanner with more than 129,000 channels. This is done by generating PET data from GATE simulations using a cluster of 60 Raspberry Pi computers to mimic the behavior of the UHR data acquisition system. During our preliminary tests, we were able to transmit data simultaneously from the 60 Raspberry PI to a host computer and, thus, to establish a baseline of the required performance before implementation. Optimized results will be presented at the conference.

Minioral

Yes

IEEE Member

Yes

Are you a student?

Yes

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