Scalable and Reliable Platform for AI-based Image Acquisition and Processing

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Motivations

- Fusion machines use images from VIS or IR cameras for plasma control and machine protection
- Complex systems need to acquire and process in real-time images from more than 50 cameras
- Scalable and reliable solution (hardware/software) suitable for AI and ML applications is required

Results

- Developed methodology, frame grabbers supporting various camera interfaces as well as universal software framework
- Tested solution based on NVIDIA GPUDirect RDMA that significantly reduces the total image processing latency
- Working on real-time AI-based algorithms for Plasma Facing Components protection

Challenges

- Processing and archiving VIS and IR images from large amounts of cameras in real-time
- Looking for low latency solutions working with MegaPixel cameras and efficient methods for data transmission directly to GPU
- Implementing and execution AI-based algorithms using FPGAs and GPUs