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Fast Data, Faster Science: Connecting Instruments to Real-Time AI Compute

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Modern scientific instruments generate vast amounts of data at increasingly higher rates, outpacing traditional data management strategies that rely on large-scale transfers to offline storage for post-analysis. To enable next-generation experiments, data processing must be performed at the edge—directly alongside the scientific instruments. By integrating these instruments with high-bandwidth, low-latency computational resources, real-time data insights can be harnessed to optimize data acquisition and experimental strategy, ultimately enabling higher-impact scientific discovery.

In this talk, we will highlight our work in enabling real-time data processing for scientific instruments, focusing on how NVIDIA's advancements facilitate AI-driven workflows at the edge. We will further discuss networking and software solutions that allow for high-throughput data streaming from front-end sensors to GPUs, significantly reducing latency and increasing bandwidth to meet the needs of next-generation scientific experimentation.

Focus areas

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