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Enhancing Real-time Data Monitoring Display through Video Streaming Technology

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Effective control of experiment flow and real-time monitoring are vital to the growing bandwidth and complexity of data acquisition systems. Unfortunately, platforms like EPICS and LabVIEW are inadequate for handling high data rates. To address this, we create a system that connects a high-speed processing component with a visualization component through a video streaming interface. We further complement the system by introducing our Bora system as the online monitoring that is platform agnostic (integrates with diverse platforms) and remotely available on the web and on mobile platforms. An evaluation of video streaming technologies, such as HLS, MPEG-Websocket, and WebRTC, is presented, assessing their suitability for modern web applications while maintaining real-time display requirements. The method involves comprehensive latency measurements across these technologies, focusing on start-up delay, inter-frame delay, and data transmission delay. Results show varying degrees of efficiency, underscoring the trade-offs between latency, compatibility, and quality. The findings show that, while no single technology is universally superior, HLS and MPEG-Websocket strike a balance between latency and compatibility for general use, whereas WebRTC excels in real-time communication at the expense of increased complexity. This research contributes to the field by providing insights into selecting suitable video streaming technologies for web-based data display. It underscores the importance of balancing data size reduction with system latency and standard interface flexibility to meet the diverse requirements of web applications.

Minioral

Yes

IEEE Member

No

Are you a student?

No

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