

# **LabVIEW RT FPGA System Optimization: Hardware Architecture Consolidation and Integrated Data Analysis Module for Enhanced DAC Control Performance**

## **Abstract**

This work upgrades a LabVIEW Real-Time FPGA-based instrumentation system and achieving hardware optimisation through strategic consolidation from a three-card to a two-card FPGA configuration while enhancing software capabilities with an integrated data analysis module. The project addresses system efficiency, cost optimization and performance enhancement within the existing Data Acquisition and Control (DAC) framework. The consolidated FPGA architecture maintains full operational functionality while reducing hardware complexity and improving resource utilization. The newly integrated LabVIEW-based data analysis module provides advanced real-time analytical capabilities, enabling enhanced system monitoring and diagnostic functions. Performance validation demonstrates significant improvements in processing efficiency, reduced system footprint and enhanced analytical capabilities. The robust and cost-effective control solution needs to be integrated with existing infrastructure while providing superior operational performance.

1. Hardware consolidation (3?2 FPGA cards)
2. Maintained/improved functionality
3. Cost and complexity reduction
4. Enhanced data analysis capabilities
5. LabVIEW RT platform advantages
6. DAC system integration
7. Performance improvements
8. Real-time processing capabilities

## **Academic Project Requirements:**

**1) Required No. of student(s) for academic project: 2**

**2) Name of course with branch/discipline: B.E./B.Tech. Electronics and Instrumentation Engineering**

**3) Academic Project duration:**

**(a) Total academic project duration: 26 Weeks**

**(b) Student's presence at IPR for academic project work: 5 Full working Days per week**

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