Thesis Title   Calibration of Emulation Card for PLC

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ABSTRACT

Industrial automation systems often face accuracy issues due to signal distortions and calibration errors, which can lead to significant operational disruptions. This research introduces an automated calibration framework for programmable logic controllers (PLCs) to address these challenges. The system dynamically adjusts input and output values in real time, reducing errors and improving signal consistency. The methodology focuses on the interaction between Siemens SIMATIC S7-1500 PLCs and General Instrument Control System (GICS) emulation cards within a hardware-in-the-loop system. By integrating real-time feedback and dynamic adjustment techniques, the framework continuously monitors and corrects the PLC's input-output relationships with the GICS card, specifically addressing signal offset issues during analog-to-digital and digital-to-analog conversions. Validation through TIA Portal software demonstrates significant improvements in data accuracy, reliability, and system stability, leading to reduced operational costs. The proposed solution enhances overall system performance, ensuring more stable operations and minimizing risks related to calibration errors in industrial automation.

Keywords: Programmable Logic Controllers (PLCs), General Instrument Control System Emulation Card (GICS), SIMATIC S7-1500