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Control and Monitoring Interface for the ITk-ATLAS MOPS-Hub System

The ATLAS Inner Tracker (ITk) upgrade requires reliable and scalable control systems for power distribution and detector monitoring. The Monitoring of Pixel System (MOPS) is a radiation-hardened ASIC for monitoring front-end electronics used in the Inner Tracker. The MOPS-Hub is a dedicated aggregation and control platform that interfaces multiple MOPS devices, concentrating power monitoring and telemetry data and providing a communication bridge to higher-level control systems. This work presents the design and implementation of a Control and Monitoring Interface for the MOPS-Hub, combining embedded firmware and a graphical user interface (GUI) to enable monitoring hardware and real-time interactions. The system integrates Low-level firmware on an Arduino-based controller; a custom binary framed UART protocol; a Python-based GUI for user level interaction, and a mode that facilitates the validation of CAN communication protocol, all of these things allowing on demand manipulation of LDO regulators and ADC monitoring, streamlining the hardware testing process compared to traditional command-line methods.

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