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PROFIBUS-DP主站网关设计及其关键技术

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Key technology on PROFIBUS-DP master gateway

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摘要　针对标准PROFIBUS-DP从站产品难以集成到现有集散式控制系统的问题,提出了网关解决方案.在对现有网关实现方案进行比较后,选用软核方案,设计了具有热插拔功能且兼容两种实现方案的硬件平台.采用模块化设计思想进行软件架构,应用状态机法实现了"PROFIBUS-DP通信"子功能.从防错设计、纠错设计、故障恢复设计等方面对设计方案中软、硬件可靠性进行了详细分析.针对硬件特性,从调度策略的角度阐述了影响系统实时性的关键问题,并对自主设计主站的难点问题-组态设计进行了说明.该方案支持系统运行过程中动态地增加和删除从站,修改从站配置参数.分析并实验测试了网关的性能参数,网关最高支持3 Mbit/s的通信波特率.实验结果表明,系统性能优越,运行稳定.

关键词：　网关　软核　可靠性　实时性　模块化

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Abstract：　To solve the problem that distribute control system is difficult to integrate standard PROFIBUS-DP slaves, gateway solution was proposed. After comparing several existing gateway solutions, soft core implementation was adopted. Hardware platform which was compatible with two solutions and supported hot plug operation was designed. Modular thought was applied to do software architecture designation. State-machine method was used to implement "PROFIBUS-DP communication" sub function. Solution reliability on both hardware and software was traversed from the view point of chip selection, fault-precaution, fault-rectify and failure-resume. Proper schedule strategy to enhance system-s real-time performance was expatiated according to hardware-s characteristics. Slave-s configuration method which is a difficult point when it comes to self-designed host was designed to support add and delete slave as well as edit slave configuration dynamically when system is running. Theoretical analysis and experimental test were done to identify gateway-s capability parameters. The gateway can support up to 3 Mbit/s communication baud rate. Experimental results show that system performance is excellent and stabilized.

Keywords：　gateway　soft core　reliability　real-time performance　modular

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