基于 STM32 的电池管理器的设计

摘 要

本设计是以 ST 公司的 STM32F401 单片机和 ADI 公司的 AD7280A 电源管理 IC 为核心，AD7280A 芯片支持通过菊花链将多个 AD7280A 串联起来，本设计通过 AD7280A 采集并平衡锂电池组的电压，采集到的电压通过 SPI 总线通信方式传输 STM32F401 中，经过处理后在 OLED12864 显示屏上显示，用户可以通过四个按键设置电压值的上限，进入或退出设置界面，是一种简单、高效、实用的设计。在实际的设计过程中按照预期的时间规划稳步完成，在绘制原理图时，使用 Altium designer 6.9 软件，结合芯片的官方数据手册与设计资料，根据设计网上下载与自己的补充绘制得到了设计需要的所有原理图库，绘制完成最终的原理图，然后在原理图上向各个器件添加了合适的封装，生成 PCB 文件,在对 PCB 图进行了布局、布线以及敷铜过程中经过多次修改最终完成了 PCB 图的制作，经过规则检查确定无误，随后完成了程序编写和实物的焊接，最后进行软硬件的调试，及时修改了错误，完成了本次设计，经过此次毕业设计，不仅掌握 STM32 的基础知识和使用，也进一步加强了自己的实物焊接能力，同样也学会如何使用固件库对 STM32 单片机进行编程。

关键词：STM32F401；AD7280A；电压；单片机；电源管理

Abstract

This design is based on stm32f401 single chip of ST company and ad7280a power management IC of ADI company. Ad7280a chip supports to connect multiple ad7280a in series through daisy chain. This design collects and balances the voltage of lithium battery group through ad7280a, and the collected voltage is transmitted to stm32f401 through SPI bus communication mode. After processing, it is displayed on oled12864 display screen, and users can communicate with each other It is a simple, efficient and practical design to enter or exit the setting interface after setting the upper limit of voltage value with four keys. In the actual design process, it is completed steadily according to the expected time plan. When drawing the schematic diagram, the Altium designer is used 6.9 the software, combined with the official data manual and design data of the chip, gets all the schematic libraries needed by the design according to the downloading on the design website and self supplementary drawing, draws the final schematic diagram, and then adds appropriate packaging to each device on the schematic diagram to generate a PCB file, In the process of PCB layout, wiring and copper laying, after several modifications, the PCB drawing was finally made. After checking the rules, it was confirmed that there was no error. Then, the program was compiled and the physical object was welded. Finally, the software and hardware were debugged, and the error was corrected in time, and the design was completed. After the graduation design, not only the basic knowledge and use of STM32 were mastered, but also the progress was made One step to strengthen their physical welding ability, also learn how to use firmware library to program STM32 single chip.

Key words: stm32f401; ad7280a; voltage; MCU; power management

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