煤矿监控系统的设计与实现

摘　　要

我们国家是煤炭大国，同时煤炭是国内最为重要能源以及化工原料，在未来的时间里面国内的能源主要就是依靠煤炭，这样的情况不会有太大改变，但是随着经济的迅速腾飞，国内对于煤炭资源的需求量也日益增大，从而引发了一系列的煤炭安全事故问题，对煤矿安全生产构成极其严重的威胁，因此对煤矿的生产环境进行监控能够保证井下生产的安全进行，能够较少井下安全事故的发生，也因此，本文设计了煤矿监控系统供国内煤矿进行使用以及推广。

本文首先设计的是一种基于单片机控制的煤矿监控系统，在系统的硬件部分是采用了C8051F040 单片机，其性能非常的高，运行快速，结构简单方便，同时配备了液晶显示屏、声光报警电路等相关的实时控制功能。在软件的设计部分是针对系统的各个功能模块进行相关的程序设计，同时还能够具备人机界面操作的功能。最后通过对系统进行测试，可以知道本系统在准确的收集开关量以及模拟量，并且进行显示方面具有很好效果，能够通过模拟采集来实现对甲烷气体的收集，通过单片机的 A/D 转换能够实现对电压信号的处理，同时对超过规定的数值会采取声光报警以及中断电源。因此可以得出本系统在设计上符合理论要求，达到了当前能够使用的标准。

关键词：单片机；煤矿监控系统；A/D 转换

ABSTRACT

Our country is a large coal country, and coal is the most important energy and chemical raw material in the country. In the future, the domestic energy mainly depends on coal. This situation will not change much. However, with the rapid development of economy, the demand for coal resources in the country is also increasing day by day, which has triggered a series of coal safety accidents and posed an extremely serious threat to coal mine safety production. Therefore, monitoring the coal mine production environment can ensure the safety of underground production and reduce the occurrence of underground safety accidents. Therefore, this paper designs a coal mine monitoring system for domestic coal mines to use and promote.

This paper first designs a coal mine monitoring system based on single-chip microcomputer control. In the hardware part of the system, C8051F040 single-chip microcomputer is adopted. Its performance is very high, operation is fast, structure is simple and convenient, and at the same time it is equipped with liquid crystal display screen, acousto-optic alarm circuit and other related real-time control functions. In the software design part, the relevant program design is carried out for each functional module of the system, and it can also have the function of man-machine interface operation. Finally, through testing the system, we can know that the system has good effect in accurately collecting switching value and analog quantity and displaying, can realize the collection of methane gas through analog collection, can realize the processing of voltage signal through A/D conversion of single chip microcomputer, and can adopt acousto-optic alarm and power interruption for exceeding the specified value. Therefore, it can be concluded that the design of this system meets the theoretical requirements and meets the current standards that can be used.

Key words: MCU; Coal mine monitoring system; A/D conversion

目　　录