Application of signal processing system in electronic information practice

Ruixue Liu[1],Ting Zou[2],Baoyi Zhang[3]
(Xi'an Siyuan University, Xi'an, Shaanxi 710038)

Absrtact: the signal processing system can be widely used in the fields of network, electronics, machinery, communication and computer, providing technical support for the upgrading of teaching platform and system, and the optimization of electronic information practice mode. In the era of "digital signal processing" technology gradually replacing the traditional "analog signal processing" technology, developers can optimize the practice mode of electronic information based on the application advantages of digital signal processing system, add some practical functions for it, improve the friendliness of the operation interface, and make it better meet the relevant use needs. Based on this, this paper first analyzes the application advantages and necessity of digital signal processing system, and then discusses its overall structure and application mode, in order to provide reference for the related technical work and R & D activities.

Key words: Electronic information practice; Signal processing system; Application; Overall structure

Introduction

With the rapid development of network technology and computer technology and the continuous advancement of information technology revolution, the traditional "analog signal processing" is gradually replaced by "digital signal processing". Building a more convenient, fast and efficient comprehensive practice platform through digital signal processing system can effectively promote the scientific, mobile and intelligent development of information engineering specialty. Next, based on the development trend of signal processing system, this paper discusses the application of signal processing system in electronic information practice from the application advantages and necessity of digital signal processing system.

1 Advantages of digital signal processing system

1. Programmable

The transmission, processing and reception of external signals are the most critical link of electronic information communication. The signal processing system plays a key role in the transformation of signals into computer language. Compared with the traditional analog signal processing system, the signal processing mode of digital signal processing system is more flexible and has the advantage of programmable control of the system, because the digital filter it uses can complete different filtering tasks such as band-pass filtering, band stop filtering, high pass filtering, low-pass filtering with the help of programming without changing the hardware.

2. High speed processing capability

High data processing speed is one of the outstanding advantages of digital signal processing system. First of all, the digital signal processing system uses the Haval chip structure, which can separate the storage space of programs and data, and give them independent address bus and data. Therefore, the electronic information platform can access the execution instructions and data, and process the data module and instruction module at the same time in the process of processing information. The application information collection and analysis of Haval chip structure provides storage space, which enables the use of these resources to obtain a more independent operation route. During the operation of the signal processing system, the information collection and analysis modules interact and cooperate with each other to lay the foundation for accurate and efficient information processing and make the information processing effect more ideal. Compared with the traditional signal processing system using von Neumann structure, its signal processing efficiency is higher and its running speed is faster. As an independent module, the signal processing system itself has a chip structure, which further ensures the smooth and efficient development of information processing, breaks through the limitations of traditional information processing methods, significantly improves the effectiveness of information processing, and meets the requirements of modern electronic information practice activities for information processing speed. Secondly, compared with the traditional signal processing system, the reliability of the digital signal processing system has also been greatly improved. It can automatically determine whether to interrupt the internal program when the signal interruption occurs.

3. Highly integrated

The digital signal processing system composed of software and chips with ultra large scale integrated circuits and extremely fast processing speed has smaller volume, more powerful functions, lower power consumption and higher cost performance. The digital signal processing system completes the task of information processing through special software and chips. Among them, the application of chips makes it possible for large-scale integrated circuits, promotes the further optimization of the structure of digital signal processing system, effectively reduces the system volume, improves the speed and convenience of information storage in the system, and provides more convenience for information processing. The application of digital signal processing system in electronic information practice can make the operation of the experimental system or platform more stable and the information storage more efficient, so as to better meet the various needs of users.

4 Application path of digital signal processing system in electronic information practice

1. Application in signal processing

Signal processing system is widely used in modern society, and has played an important role in promoting the development of related fields. Traditional information processing has many shortcomings. Although it can meet the needs of users to a certain extent, it has some disadvantages, such as difficult to ensure the quality of information processing, time-consuming, large consumption of financial, material and human resources. With the development of society, the amount of information that needs to be processed in the practice of electronic information increases significantly, and the data types are more complex. The traditional signal processing system that lacks centralized processing function is gradually difficult to meet the experimental requirements. Digital signal processing system has high-speed processing ability and high integration. Its application in signal processing can effectively improve the efficiency and accuracy of data information processing, help operators save a lot of experimental time and improve the success rate of experiments.

2. Thinking of designing signal processing system

In the practice of electronic information, the main task of signal processing system is to analyze and integrate information. The digital signal processing system places the system channel responsible for information input and output inside the system, which can more effectively complete all kinds of information analysis and processing tasks, and realize information sharing, which greatly improves the convenience and comprehensiveness of information acquisition for experimental personnel. In the whole digital signal processing system, the computer is the dominant structure. It needs to play a cooperative role with the signal processing system to make the data analysis more accurate and reliable, which has a very important impact on the experimental process and results.

3. Structure analysis of signal processing system

The computer signal processing system is mainly composed of signal processing system and computer microcomputer unit. In the process of electronic information practice, the work of importing the collected data information is mainly completed in the computer unit. After the experimenters give instructions through corresponding operations, the language analysis function module and digital filter in the computer will collect the information, and then input it to the signal processor for conversion. The processing center analyzes and sorts out the received analog signals, and then displays the results through the computer, providing the basis for the next operation of the experimenters. The screening and analysis of signal processing system effectively ensures the reliability, authenticity and accuracy of information, and provides more convenience for experimenters to operate experiments, access data and access information.

4. Research on DSP application software

(1) DSP software for FFT

From “interrupt start” to “interrupt return”, it needs to go through such steps as on-site protection, reading the interrupt identification code from the PC (calculating the spectrum interrupt code), transmitting time-domain data to the specified memory block, FFT operation of the data, transmitting the operation result to the specified frequency harmonic data storage module, and on-site recovery. The DSP software to realize FFT needs to complete the task of analog data processing according to the relevant requirements. In this DSP software, the real-time processing of data depends on the external real-time signal source, and the processed analog signal needs to be transmitted to ADC, so that the DSP system can complete FFT operation.

(2) DSP software to realize digital filter

The specific process of signal processing by this DSP software is “interrupt start - field protection - read interrupt ID from PC - send array (or send error message) - field recovery - interrupt return”. In this software, the main function of digital filter is to respond to the pulse of infinite length unit and the pulse of finite length unit, and each filter needs to process analog data and real-time signals, and each data processing path adopts different sampling frequency, high pass and low pass, which is conducive to the experimental personnel to accurately understand and grasp the digital filter in the process of operation.

Epilogue

In a word, the signal processing system is widely used in the fields of network, electronics, machinery, communication and computer, which provides important support for the development of related fields. With the increasing amount and types of information to be processed, the digital signal processing system has gradually replaced the traditional signal processing system. Using this technology to improve the electronic information practice operation platform can effectively improve the signal processing ability and stability, and strengthen the advantages of fast processing speed, low energy consumption and high integration of relevant functional modules.

References:

[1] Wang Liu,Hua Li Application of signal processing system in electronic information practice [j]Computer knowledge and technology, 2020,16 (29): 102-103

[2] Xiaogang Tan,Ye Shi,Bin Zhou,Bing Yang,Xing Jiang Design and application of automotive switch signal processing system based on uncertainty and wide boundary [j]Automotive technology, 2020 (04): 98-104

[3] Zhuo Chen Application analysis of signal processing system in electronic information practice [j]Electronic technology and software engineering, 2020 (13): 61-62

[4] Xiaojuan Wang Application of compressed sensing theory in power system signal processing and data compression [d]South China University of technology, 2020

[5] Qiang Wang,Piao Lu,Zhengcheng Zhou,Yan Yang,Honghong Zhang Application of signal processing system in electronic information practice [j] Electronic technology and software engineering, 2020 (08): 226-228
[6] Qiang Qiang Application of digital signal processing technology in measurement and control system [j]Communication world, 2019,26 (12): 110-111
[7] Xingxiang Feng Application of signal processing system in electronic information practice [j]Journal of Zhejiang University of water resources and hydropower, 2019,31 (06): 63-67
[8] Meilin Yi Research on the application of signal processing system in electronic information practice [j]Digital world, 2019 (12): 31
[9] Xiaogang Tan,Ye Shi,Bin Zhou,Bing Yang,Xing Jiang Design and application of automotive switch signal processing system based on uncertainty and wide boundary [c]/2019 proceedings of the annual meeting of the Chinese society of Automotive Engineering (4), 2019:303-308
[10] Xue Ben Research on signal processing system in electronic information practice [j]Introduction to scientific and technological innovation, 2019,16 (30): 108-109
[11] Xueqiang Tao Application of signal processing system in electronic information practice [j]Electronic production, 2019 (20): 97-98+45
[12] Bo Zhang Research on the application of signal processing system in electronic information practice [j]Science and technology wind, 2019 (25): 111
[13] dejian Wang Design of high frame rate videosar real-time signal processing hardware system [d]Xi'an University of Electronic Science and technology, 2019
[14] Shujing Zhang,Bin Yang,Tianqi Cheng Important application of distributed display and control signal processing technology in early warning and emergency command system [j]Intelligent building and smart city, 2019 (08): 46-48
[15] Lei Yang,Jiayin Song Application analysis of sRIO in high speed signal processing system [j]Information and computer (theoretical Edition), 2019 (04): 94-95