New Developments in Electronic Measurement Technology - Virtual Instruments

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Abstract: Under the rapid development of China's current information technology and science and technology, various advanced instruments and equipment have been widely used, and power measurement technology has been further developed. New electronic measurement technology—virtual instrumentation has emerged, and has been established in different fields. More applications provide greater support for the further development of power measurement technology. This paper will introduce the development history of virtual instruments, analyze the composition and application of each system of virtual instruments, and improve the application range of electronic measurement technology-virtual instruments in various fields.

1. Introduction
Under the background of rapid development of information technology, circuit technology and communication technology, electronic measurement technology has been further developed. The composition of various parts of the instrument has gradually become more complicated, its practical application functions are also more and more, the measurement function has gained greater progress, it played an important role in the measurement field and it has become the focus of current research in the field of measurement. The development and application of virtual instruments have promoted the development of electronic measurement technology. In the 21st century, electronic measurement technology has entered a new information age, gradually upgrading from traditional measurement technology, and gradually changing from traditional hardware systems to Software system-based measurement technology. The application of electronic measurement technology to computer technology, microelectronics technology and software technology has greatly improved in technology and instrumentation. New test theory and test methods have been continuously applied, breaking through the functions and functions of traditional instruments, virtual instruments. Some computer hardware devices and instruments are integrated into the instrument to realize the computer processing function of the instrument, which can effectively realize the storage and processing of data.

2. Explain the Contents of Virtual Instruments

2.1 Virtual Instrument Definition
The rapid development of computer technology in China has promoted the development of measurement technology. New types of measuring instruments have begun to appear. The rapid development of virtual instruments has become the latest trend in the development of instruments. Virtual instrumentation equipment can utilize advanced computer technology, hardware of instrumentation equipment and the software system forms the most basic function. The virtual instrument is to operate the measuring instrument by using computer technology and information technology, and define the measurement process, which can effectively complete the collection,
analysis and judgment of the measurement data information. Virtual instruments can convey information resources through software, and can gradually eliminate some functions of traditional instruments, and apply some technologies of the current instruments to them. The application and development of virtual instruments is also the progress of measurement technology. In the new development stage of society, it needs focus on the research of virtual instrument functions, and realize the measurement function of the instrument from the software aspect of the instrument. The application of virtual instrument can replace the traditional measuring instrument, can realize automatic control, and has a special instrument system. The advantages of virtual instruments are as follows: First, the virtual instrument has strong functionality and high cost performance. It is rich in traditional instrument functions, and the user's convenience in use increases, which can further promote the network development of virtual instruments; The traditional instrument technology is innovated and applied to advanced network technology. Users only need to operate on the network interface to complete the measurement work, effectively improving the measurement technology and efficiency. Third, the hardware system of the virtual instrument is gradually becoming systematic. And the direction of modularity helps to standardize the measurement work.

2.2 Advantages and Disadvantages of Virtual Instruments and Traditional Instruments

The traditional instrument is a separate mechanical equipment, its structural components are relatively simple which consisting of the most basic functions such as switches, buttons, image windows and printouts. Traditional instruments and equipment are needed in the actual use process. Operating with a fixed software system, the production mode is relatively fixed, and the function is used in a fixed mode. Under the rapid development of current information technology and network technology, the components of electronic instruments are constantly changing. The electronic instrument components and types on the market are constantly enriched. The functions of electronic instruments are more powerful and accurate, and the performance of human-machine interface is improved better. Moreover, the virtual instruments are all organically connected by computer hardware and software systems, and the internal configuration can be constructed according to personal preferences, and can form instruments and equipment that meet their own requirements. Virtual instrumentation equipment and traditional instrumentation equipment are used to collect measurement data, perform data analysis, and obtain corresponding test results. The performance of virtual instrumentation equipment is flexible, with customized operation functions, and in the future application of information technology. Virtual instrumentation equipment will replace traditional instruments and equipment, and has a good application effect.

3. The Important Role of Virtual Instruments in Electronic Measurement

The application of virtual instruments has great advantages, and it can quickly promote its wide application in the field of measurement. It will also have better measurement results and will play an important role in the field of electronic measurement, compared with the traditional The measuring instrument and the virtual measuring instrument occupy a greater advantage in the function configuration. The traditional measuring instrument can only perform a single measurement in the actual application process, and has a fixed measuring hardware. The measuring method is also relatively fixed, and the virtual instrument measuring is correct. The update and improvement of traditional measurement technology is gradually developing towards an integrated direction. The application of new technology has promoted the further development of electronic measurement technology. The level of traditional electronic measurement technology can no longer meet the actual needs in the current measurement field. The combination of communication technology and electronic measurement technology can collect measurement data in the measurement field, and can use system software to analyze data information and promote the further development of virtual instrument technology. The application of virtual instrument technology to the field of electronic measurement can reduce the cost of measurement to a certain extent and improve the efficiency of measurement. Virtual instrument has become the most prominent technology in the current measurement field and is
widely used in various fields. In terms of composition, the virtual instrument is mainly composed of computer system, software system and instrument hardware system. In the actual application process, the virtual instrument hardware system and the computer are organically combined and applied.

![Diagram of the virtual instrument structure]

**Figure 1** The structure of the virtual instrument

### 4. Application of Virtual Instruments in Different Fields

The wide application of virtual instruments is also the inevitable result of current technology development, and has become an important technical solution in the field of instruments. The advantages of virtual instrument technology itself make it a wide range of applications, and it is widely used in various fields of society. It mainly includes fields of scientific research, measurement, detection and measurement. The technology of virtual instruments is relatively advanced, and it is also in line with the current trend of social network technology development. It is also an important product under the development of network technology and information technology. Its functions are relatively powerful and can replace the traditional Many functions of the measuring instrument can integrate the functions of various common instruments such as logic analyzers and signal generators. The operation is flexible and can realize the interface visual operation. The user can perform the actual operation according to the operation flow, which can effectively realize the automatic measurement and collection of data, and form a unified automatic measurement system with other devices. For example, virtual instruments have been widely used in medical, vibration analysis and fault diagnosis.

#### 4.1 Instrument Metering System Application

Virtual instruments are commonly used in logic analyzers, signal generators, and voltage ammeters. These important instruments are measurement devices used in R&D labs and research institutes. They can be used with related data acquisition and data processing. Traditional measuring instruments need to equip a lot of equipment and cross-use multiple instruments, the whole process is relatively cumbersome. With the integrated virtual measurement system, automatic measurement, automatic recording and data collection and processing can be realized effectively. The equipment cost is relatively low. The virtual instrument has a good price advantage and has a good development in the field of instrument measurement.

#### 4.2 Industrial Applications

In the industrial field, the application range of virtual instruments is also extensive. Some systems in the industry need to sample related data, and need to be applied to virtual instruments, which can realize fast transmission and processing of data information. The virtual instrument system can realize integrated design of measurement and control. At the same time, in the manufacturing industry, the computing power of virtual instruments can achieve online monitoring and play an important role in the industrial field.
4.3 Application in the Electronics Industry

Virtual instruments are widely used in electronic measurement, and the functionality of their applications is continuing to develop. The performance of virtual instruments is more practical and advanced, and has been widely promoted and applied in the electronics industry. (1) In the application of measurement, the flexibility of virtual instrument can be developed synchronously with computer technology, and the accuracy in measurement is continuously improved, which can reduce the cost of measurement, save more time and improve measurement efficiency. (2) The virtual instrument is applied to the monitoring aspect, which can collect the data information, record the transmitted data in time, perform statistics and analysis on the data, and enable the monitoring function to be effectively played. For example, the virtual instrument is applied. It can play a big role in water quality monitoring and remote monitoring. (3) The application of virtual instruments in distance education. In the era of rapid development of information technology, advanced technologies are applied to the field of education, which promotes the development and progress of the education industry. The widespread use of virtual instruments in the field of distance education has played a very important role. The use of virtual instruments to build a specialized education system can save costs to a certain extent. In addition, the virtual instrument system has great flexibility, can be reused all the time, and has great flexibility in teaching. (4) The application of virtual instruments in the processing of engineering problems, virtual instruments can be applied to all stages of engineering processing, and can provide corresponding services for each stage of work, including in research and development, production testing and so on. For example, the virtual instrument integrates functions such as alarm management, data tracking and safety network. In the actual production process of the project, it can play the effective role of the virtual instrument and combine it with the industrial configuration to improve the actual production efficiency.

5. Application of Virtual Instrument in Electronic Measurement Technology

5.1 Application of Virtual Instrument in Electronic Measurement Software System

In the application process of virtual instruments, the application of software systems is at the core position and can play an important function. The application of software systems can greatly reduce the cost in measurement and improve the overall performance of the application system, and the application The flexibility is relatively high. In the virtual instrument system, the main functions of its software system are: driver, VISA library and application. In the actual operation process, the measurement task and the measurement target need to be input into the software system in advance, so that the measurement software has a certain purpose, and for some complicated measurement targets, the software system can be used for completion. The virtual instrument software system has great advantages, and has great flexibility. It can replace traditional hardware devices in practical applications, and can effectively play its own functions. In engineering, the formation and analysis of signal measurement also needs to be applied to the measurement technology of virtual instruments, which can effectively combine the software and hardware technologies in the system and give full play to the initiative of measurement technology. For example, the process of electronic measurement requires high accuracy of data. In the actual practice process, the user needs to use the instrument to perform measurement, and can operate through the control interface, and the user can obtain relevant data information from the control interface. A job provides relevant data references. In addition, for the analysis of the data, the data analysis function can be analyzed by using the data analysis function on the control interface, which combines the computer technology with the function library function, can ensure the efficiency of data processing in the virtual instrument system, and drive the software. The application is mainly to adjust the relevant instruments to assist in the completion of electronic measurement work.

5.2 Application of Virtual Instrument in Hardware System

The application of the hardware system in the virtual instrument is the data processing object of the
detected system. By inputting the relevant measurement signals in the hardware system, the reflected data is input into the relevant processing module, and the signal processing can ensure a reasonable range. Internally, the accuracy of the measurement is fully guaranteed, and the output signal is more accurate. For example, virtual instrument technology can realize automated large-scale operation in electronic measurement, ensuring that the measurement accuracy meets certain requirements, and effectively promotes the implementation of the measurement system in the information system. The PXI bus technology and kernel technology that are usually applied can ensure The normative nature of the measurement work, the technology can be combined with computer technology, some manual operations can be replaced to ensure the effectiveness of the measurement, and its own has a good development, the virtual instrument platform can provide a better platform for electronic measurement technology development. In the corresponding processing module, the virtual instrument platform can detect the amplitude range of the network output signal, obtain more accurate positioning, and ensure the accuracy of measurement.

6. Conclusion

In summary, in the context of the current rapid development of information technology and science and technology, the application scope of virtual instruments is more and more wide, and its own functional advantages ensure the accuracy in the electronic measurement process, the development of virtual instruments. And application is an important product of the information age and plays a very important role in the development of many fields of society. In electronic measurement technology, virtual instruments need to be combined with related measurement tasks and objectives to optimize the relevant software and ensure the accuracy of the measurement.

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