Multi-channel analyzer controlled by applet and flash

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Abstract Both java applet and flash were applied to emulate virtual panel of multi-channel pulse height analyzer (MCA), and Microsoft IE browser was used to control MCA through internet to measure the γ-ray energy spectrum of ^{137}Cs. It was shown that most of the work completed by applet can be done by flash too, and with flash, more beautiful panel of the remote controlled instruments can be easily designed.

Keywords MCA, Applet, Flash

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1 INTRODUCTION

The multi-channel analyzer (MCA) is the heart of most experimental measurements. It performs essential functions of collecting the data, providing a visual monitor, and producing output, either in the form of final results or data for later analysis.[1] Remote controlled MCA is very important in remote experiments. We applied java applet and flash, respectively, to emulate virtual panel of multi-channel pulse height analyzer (MCA), and Microsoft IE browser was used for the remote controlled MCA to measure the γ-ray energy spectrum of the radioactive source.

2 MCA REMOTE CONTROLLED BY APPLET

A block diagram of MCA controlled by applet is presented on Fig.1. An applet-controlled MCA contains a hardware for the analog-to-digital converter (ADC) and a server that include the control file, data file, common gate interface (CGI) programs, together with the interface card and java applet. The interface card links ADC with server, and the behaviour of ADC is controlled by the server according to the contents of the control file. The change of the control file's contents will result in the corresponding operation of ADC, for example, "start", "stop", "clear data", etc. When user visits MCA www server through Internet explorer, an applet, which emulates the virtual panel

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of MCA, developed by visual café[2,3] runs. A spectrum will be displayed on virtual panel in real time.

A γ-ray spectrum of ^{137}Cs collected by applet-controlled MCA is presented on Fig.2. The following function buttons are displayed on the virtual panel: "start" and "stop", which start or stop data collection; "clear", clear data; "+" and "-", change the vertical range of spectrum data; and ">" and "<", move the cursor to right or left. The data at cursor are also displayed. When function button is clicked, an http request is sent to www server, a personal www server (PWS) of Microsoft Windows. The CGI programs written by PERL language,[4] which respond to applet application, change the contents of the control file. The data are sent back to applet and a spectrum is displayed in real time. A $\phi 7.6 \times 7.6$ cm NaI(Tl) γ-ray detector and a ^{137}Cs radioactive source with an activity of 37 kBq, about 10 cm apart from detector, were used in our experiment. The channel number of the ADC, the maximum of which is 8192, was set to 512 in the experiments due to low energy resolution of the NaI (Tl) detector. The spectrum collected by remote user is the same as that by local user, because the remote control process does not result in any data change during the data transfer. The experiment with a 370 kBq ^{60}Co radioactive source was also finished.

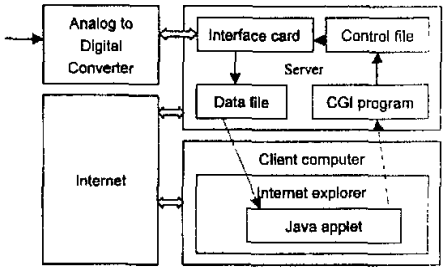

Fig.1 Block diagram of MCA controlled by applet

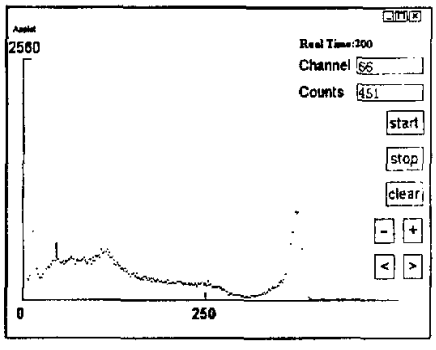

Fig.2 A γ-ray spectrum of ^{137}Cs collected by applet-controlled MCA

3 MCA REMOTE CONTROLLED BY FLASH

In order to improve function of the remote controlled MCA, flash was used instead of applet to emulate the virtual panel of a multi-channel pulse height analyzer (MCA) recently. Flash, the product of Macromedia with a vector based system, is a very powerful tool in the design of animations. The player of flash is really small: only 150 kB. With flash, we can design more beautiful panel of virtual instruments. The communi-

cation between www server and flash is implemented by command "load Variables (url, location)" of Action Script, which is supported by Flash 5.0, and follows the ECMA-262 standard (the specification written by the European Computer Manufacturers Association). A γ-ray spectrum of ^{137}Cs collected by remote flash-controlled MCA is presented on Fig.3.

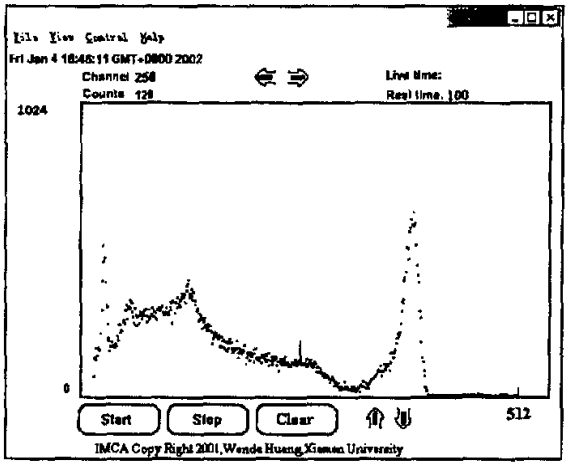

Fig.3 A γ-ray spectrum of ^{137}Cs collected by flash-controlled MCA

4 CONCLUSIONS

Our work shows that both of applet and flash can be used in designing the panel of the remote controlled instruments, but the startup of flash is quick compared with applet. With flash, we can easily design more beautiful panel of the remote controlled instruments.

References

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