Implementation of Open Virtual Measurement Testbed

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Abstract. This paper is concerned with the development of remote measurement testbed using the internet. Recently, various virtual instrument laboratories are introduced using the multimedia technologies but the Internet based remote testbed using the electrical power measurement hardware system is not present. In this study, we developed the remote electrical power measurement testbed by combining the GPIB program which controls the hardware with the web programming which controls the internet. The high power load and programmable AC power source were considered as the measurement devices. The client program includes the user-interface and IP camera which carry out power measurement and report remotely. Several electrical measurements were set up to verify the test process. It has been found that the virtual measurements are feasible and valid. The methodologies will be discussed in detail.

Keywords: Virtual measurement testbed, High power load, Programmable AC power source, GPIB.

1 Introduction

The technique of Internet and the remote virtual experiments have been applied in many fields for many years. In electrical and electronic measurement tests, the main problems are increase in instrument cost and complexity, and the limited budget for the equipment. The development of telecommunication and information technologies has opened new possibilities in realization of sharing in the field of measurement [1].

In this paper develops open virtual measurement testbed that performs electrical power test using the electrical load and programmable AC power source through the Internet. The result of this experiment shows the possibilities of remote measurement testbed.

2 System Overview

The server in the testbed is connected to measurement instruments like high power electrical load and programmable AC power source. When users log in to server over the Internet, they are able to control the equipments. An IP camera can also be used to

live broadcast what is happening in the testbed. It does not matter if the user is in a nearby testbed or on the other side of the world. To achieve that mentioned above, a client-server distributed environment was designed, as shown in Figure 1.

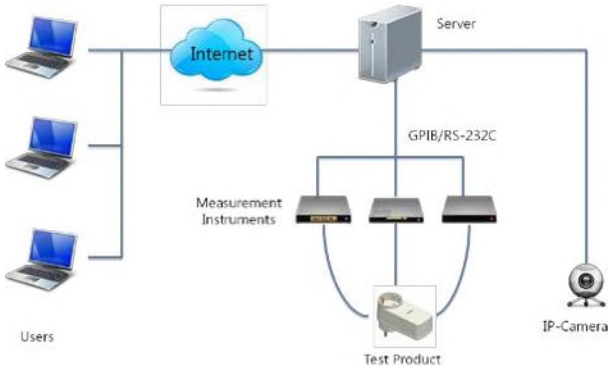


Fig. 1. System configuration.

2-1. Server Systems

The network configuration and control flow of server/client system appears in Figure 2.

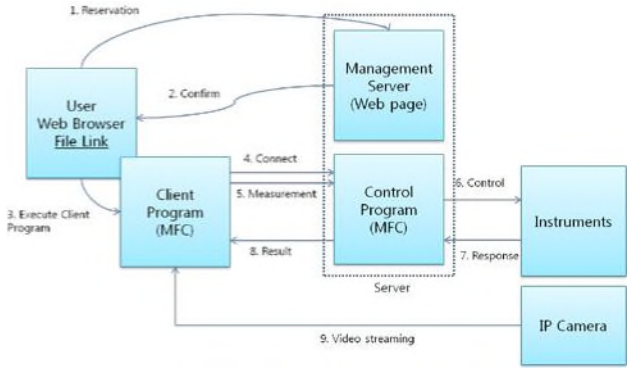


Fig. 2. System flow.

The server system is composed of a web server, and a control program. The web server carries out communication with client to log in and to reserve schedules. The control program is made up MFC as its front end for control and communication with measurement instruments through GPIB/RS-232C. An IP camera (SONY SNC-P5 Network Camera) is attached to experiment set-up.

2-2. Measurement Instruments

The High Power Electronic Load (PRODIGIT Electronics Co. Ltd., 3250A) is used for evaluation of the specification characteristics of AD/DC high power suppliers and the service life characteristics of batteries. It can be used to work with GPIB/RS-232C interfaces [2].

The Programmable AC Power Source (EXTECH Electronics Co. Ltd., 6600) is very useful for performance evaluation of electrical and electronics equipments in non-ideal conditions of the ac power system. The power source has comprehensive measurement of voltage, frequency, current, power and power factor. It also provides GPIB/RS-232C interfaces [3].

(a) High power electrical load (b) Programmable AC power source

Fig. 3. Measurement instruments.

3 Experiments

Figure 4 illustrates the measurement set-up to testbed.

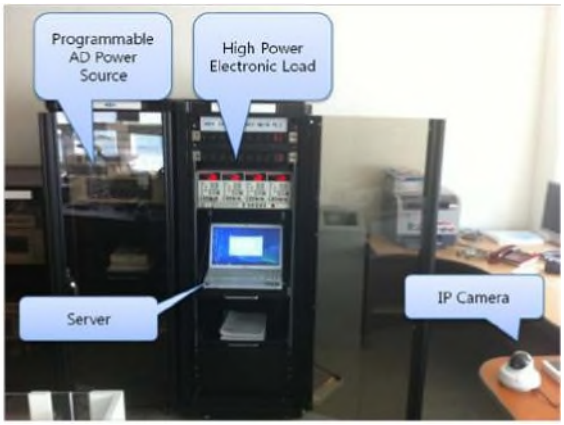
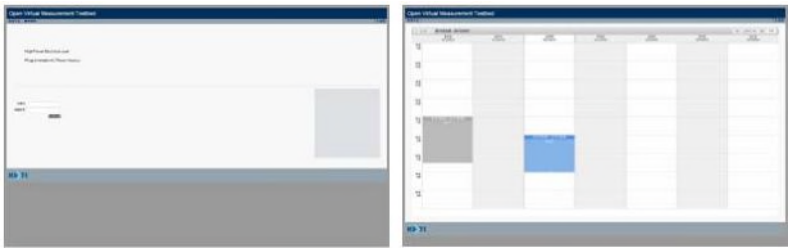


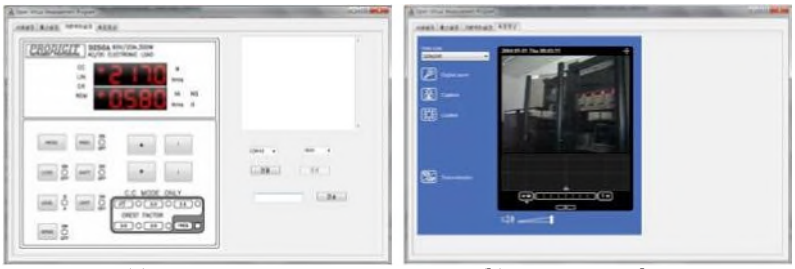
Fig. 4. Measurement set-up.

Figure 5 is screenshot of web page. Figure 6 is client software developed in Visual C++ for this paper which manages the communication with the Internet.



(a) Main page (b) Reservation page

Fig. 5. Screenshot of web page.



(a) Measurement (b) IP camera video stream

Fig. 6. Screenshot of client program.

4 Conclusions

A methodology has been developed and demonstrated for electrical power test that is based on the electrical load and programmable AC power source through the Internet.

To implement open virtual measurement testbed through Internet, the server-client interface program was proposed. Remote users can control the real instrument and view the real time result of experiment at the same time.

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References

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