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A MEASUREMENT SYSTEM FOR REMOTE TEACHING AND EDUCATION

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Abstract – In the present paper, prototype architecture for an educational measurement system having geographical distributed users is illustrated. The students are required to use only a simple commercial Internet Web browser. In this way, several geographically remote stations can economically offer a more complete educational proposal specialised in different measuring fields.

Keywords: remote teaching

1. INTRODUCTION

Low-cost availability of new tools for communications based on multimedia and geographic networks is opening more and more horizons to remote teaching. Advanced experiments on CD ROM-based hypertexts for interactive learning [1-7], Internet World Wide Web (WWW) sites on geographic networks for providing access to tutorial data-bases, remote sensing for remote teaching and training, satellite-based conferences as seminars for developing remote courses for pupils or employers directly on site [8-9], and so on, are in progress.

In measurement teaching, the great increase of students on the one hand, and the reduced number of technicians on the other, greatly requires the possibility of accessing real measurement instrumentation for remote experiments [10-14]. In electrical and electronic measurement courses, particularly, these problems become more severe as consequences of the more sophisticated and expensive apparatus now available which makes it difficult to keep the technical staff up-to-date, and the necessity for repeating the same experience many times in order to make all students able to operate the measuring instrumentation.

LabVNC allows you to painlessly and instantly enable web control of virtual instruments VI. LabVNC will create a Java applet on the fly that is an exact representation of any VI chooses. This Java applet will run in a remote client browser and will give them full control of your VI, just as if they were at your desktop. LabVNC is based on the VNC (Virtual Network Computing) protocol (figure 1).

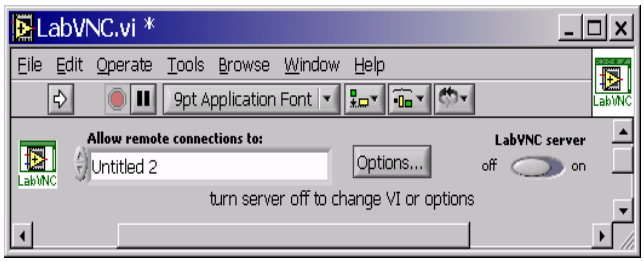

Fig.1. LabVNC front panel

2. SYSTEM REQUIREMENTS FOR USING LABVNC

LabVNC consists of a VI control panel, some DLLs, and a binary executable that is the LabVNC server. Currently the server only runs on 32-bit Windows. The system

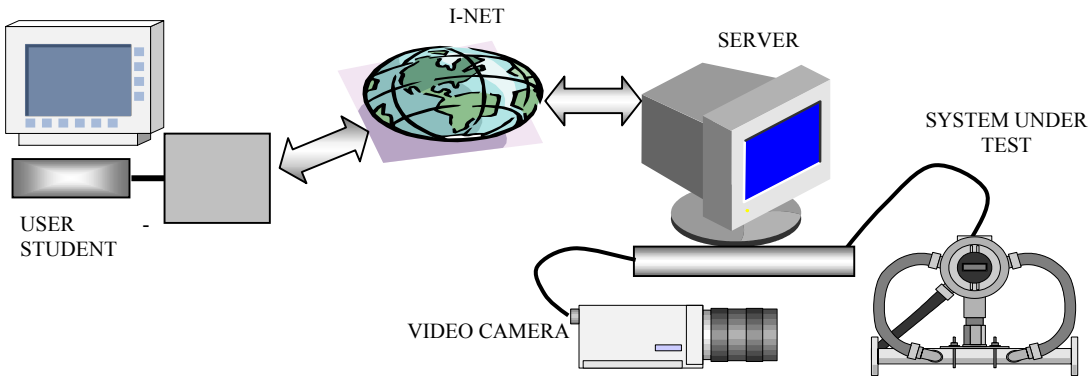

Fig.2. System architecture

requirements is LabVIEW 6.0 or greater installed on the server machine.

The remote clients can be on any platform for which there is a Java-enabled browser (Linux, MacOS, etc.) The client does not need anything special, except any recent Java-enabled web browser (e.g, Internet Explorer 5).
Is not possible to run a client on the same machine as the server. Is must be using two or more separate networked machines.

2. SYSTEM ARCHITECTURE

An educational measurement remote system is proposed. The architecture is composed by to part: user and measurement provide as shown in figure 2. The student is able to watch via video camera to all the transformation that he command from front panel.

Following main parts are composes the measurement system: a personal computer connected at video camera using USB interface, a data acquisition board that provided analog input or output and a GPIB board.

Two cases are possible for remote teaching and education. In the first case, the professor from server room, after hi set the server to *all user slaves*, can teach in the same time all the students connected (figure 3). In this way, the students from their home study points can receive and follow the lessons. Number of students connected in the same time is unlimited.

In the second case the server is set to *all user master*. The students are able to perform the connection via modem and provider until server, in order to training and practice the programs.

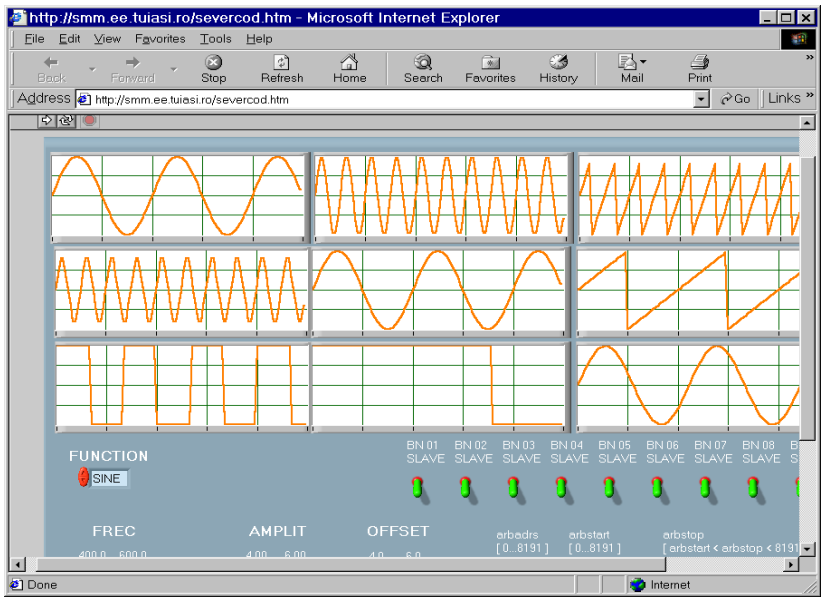

Fig.3. Server front panel under Explorer

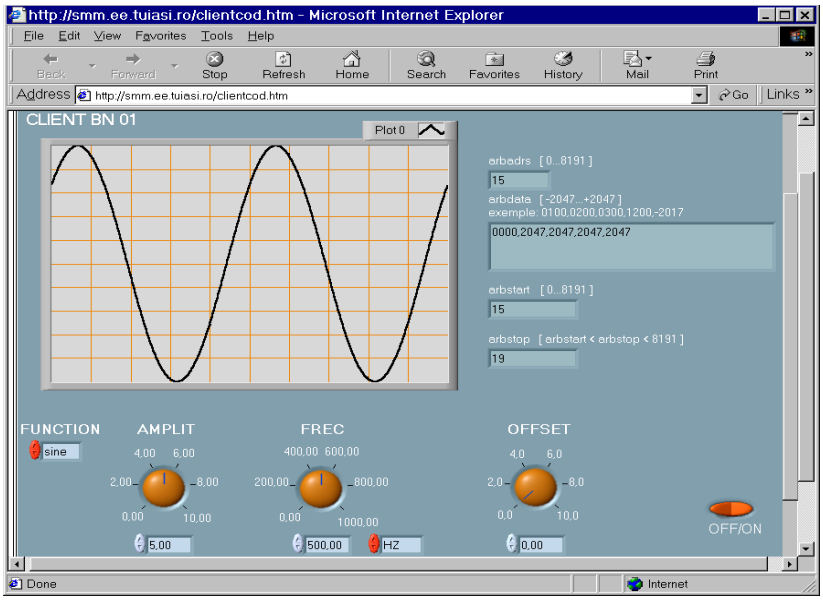

Fig.4. User front panel under Explorer

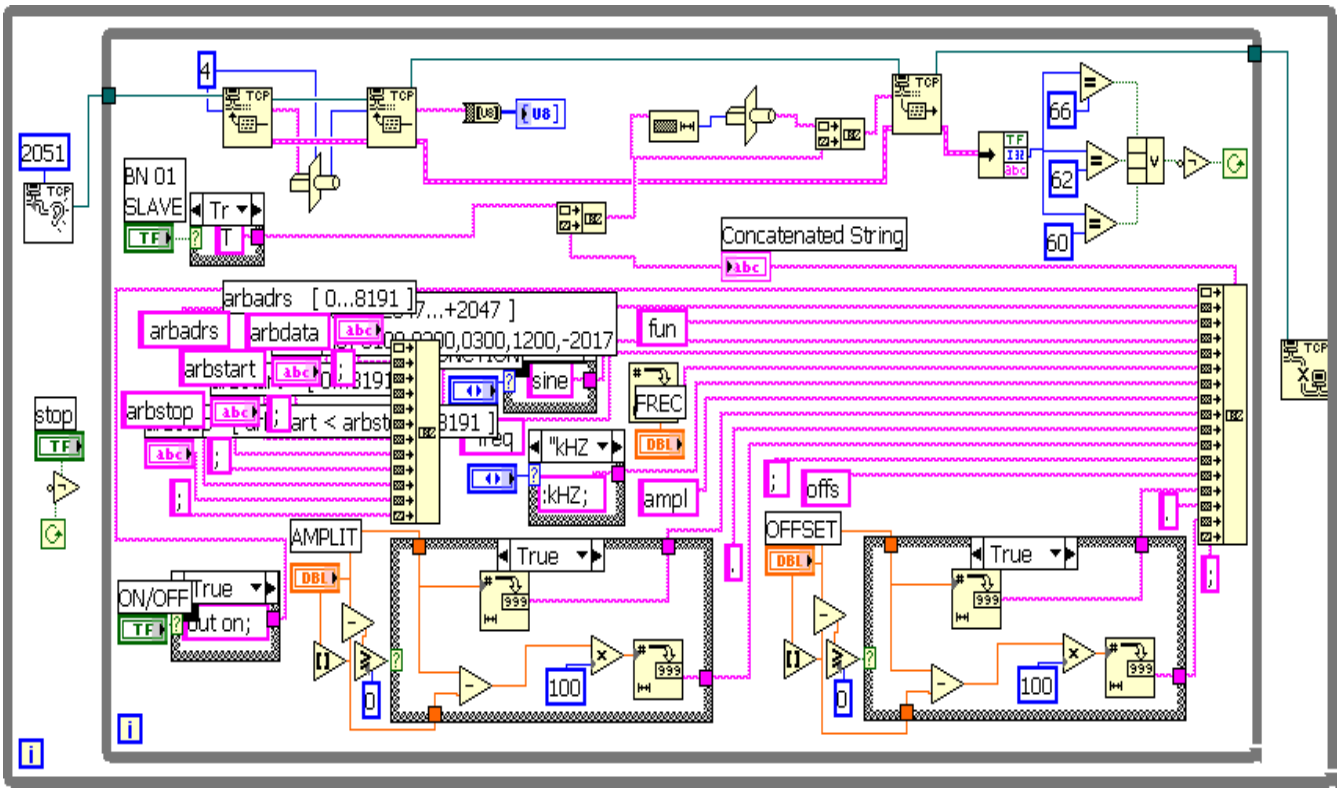

Fig.5. Server bloc diagram

In The front panel of a remote application example is presented in figure 4.

All communication software is designed under LABVIEW 6.1 graphical programming language, including three protocol tips. Communication PC-instruments is developed using GPIB protocol, PC-server using TCP/IP and Internet communication using data socket technology.

The bloc diagram of the server virtual instrument is presented in figure 5, and involves a TCP-IP protocol for communication between server machine and measurement devices.

4. CONCLUSIONS

The Internet continues to become more integrated into our daily lives. This is particularly true for scientists and engineers, because designers of development systems view the Internet as a cost-effective worldwide standard for distributing data. The customers can easily publish data from their programs to the Web using the LabVNC.

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