Application of Remote Instrumentation in Learning using LabView

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Abstract – **In this paper is suggested block diagram for remote control and measurement that use computer networks. Also it is discussed how the configuration of the LabView Web Server can be set, in order to realize remote control and measurement.**

Keywords – **Instrumentation, Remout control and measurement, LabView.**

I. INTRODUCTION

In the practice very often situations occur by which the signal source, whose parameters must be measured is at a great distance from the system of data collection. The reasons for this may be different: the sources of signals which are a major area of study can be operating in harmful environment or can be positioned on moving objects, inaccessible places and others. This requires the transmission of measured parameters to the system for collecting and processing data. This process must be resistant to information distortion or noise. These adverse events may be due to external interference, influence from the transmission medium, the circuits of the transmitter and receiver.

The use of computer communication networks for the transmission of measurement information is based on standard networking protocols used in local and global computer networks. In the model, TCP / IP are several major groups of records. There are possible two main approaches: the use of protocols confirming the information received (TCP / IP) or without confirmation (UDP / IP). First protocol ensure receipt of all information, but any inclusion of additional data in order to improve data transmission slows the performance of this method. The second protocol allows faster transmission of measurement data, but at the expense of losing the package if it can not be restored.

II. APPLICATION OF LABVIEW FOR TRANSMISSION OF MEASUREMENT DATA IN COMPUTER NETWORKS

LabView software product allows to build virtual instruments, which can run in a simulation or real signals [5,6]. To measure the real physical signals can be applied

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several approaches:

- Using specialized test modules;
- Using standard instrumentation that enables management and transmission of data over serial interfaces (RS232, USB, etc..)
- Using specialized instrumentation using other communication interfaces (GPIB, Serial, TCP/IP, UDP/IP, etc.).

III. BLOCK DIAGRAM FOR REMOTE CONTROL AND MEASUREMENT

Fig. 1 shows a block diagram for remote control and measurement that uses a computer network to realize the transmission of measurement data over long distances. It contains: object, measurement module, LabView program, LabView server, Internet (computer network) and users (students).

The physical parameters that must be measured are converted into electrical quantities using sensors. These electrical parameters are submitted to the measuring module. LabView software is necessary to build an appropriate virtual instrument designed for a specific measurement. In this way the results of measurement of the local computer can be monitored. In order to access the results through the computer network the Internet server (Web Server) must be configured.

IV. WEB SERVER CONFIGURATION

Publication of the results of the measurements are done by LabView Web Server. Access to its options settings is done from the menu Tools -> Options. Configuration includes the following steps:

A. Web Server: Configuration

Enable Web Server, it appears Root Directory, of the HTTP port and Timeout (fig. 2). These parameters can be set to default option or them can be assigned specific values if necessary.

B. Web Server: Visible VIs

Selects the option Allow Access (fig. 3).

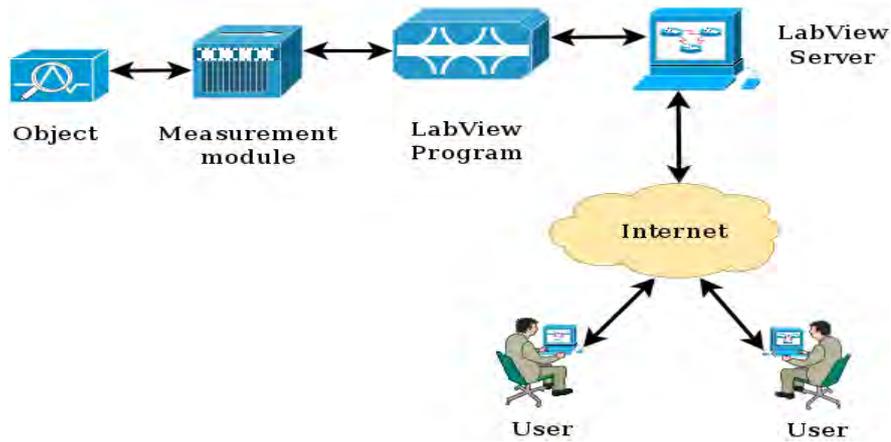### C. Web Server: Braowser Access

Fig. 1. Block diagram for remote control and measurement that uses a computer network.

Selects the option Allow Access and Controlling (fig. 4). Controlling option can be enabled or disabled if required users

selects the option Allow Access option and enter the IP address of LabView Web Serve (eg 192.168.1.1) or the name of LabView Web Serve www.example.com (fig. 5).
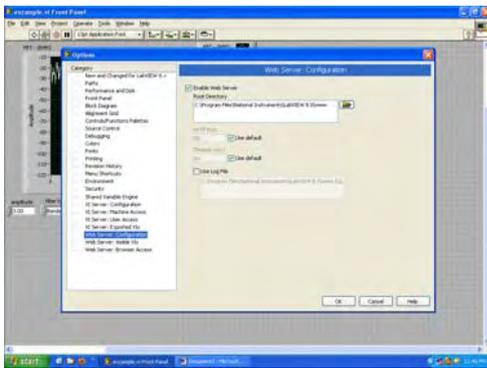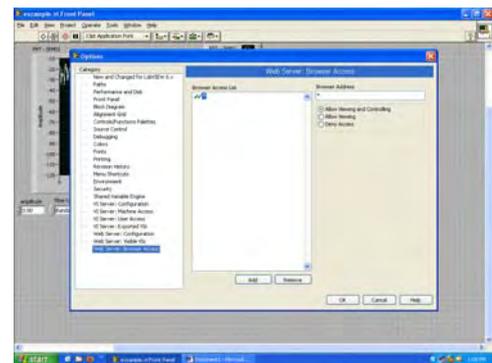

Fig. 2. Web Server: Configuration.
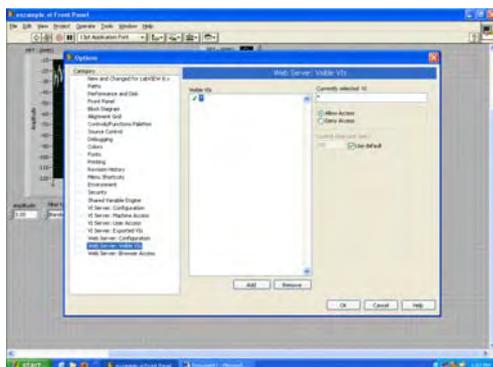

Fig. 4. Web Server: Braowser Access..
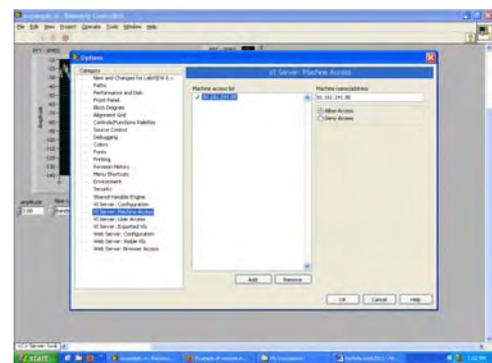

Fig. 3. Web Server: Visible VIs.

Fig. 5. VI Server: Machine Access.

to have access to start and stop the measurement process in Web Braowser.

D. VI Server: Machine Access

V. Web Publishing Tool

After configuration of the LabView Web Server is necessary to define the parameters of the web page of the virtual instrument. These parameters can be configured from the menu Tools -> Web Publishing Tool. The configuration contains the following stages:

A. Select VI and Viewing

Choose the virtual instrument, for that the results of the measurement have to be displayed on the website. In this box set and way of displaying the results (static picture, painting renovated over a period of time or dynamic graphics for remote control via web page) (Fig. 6).
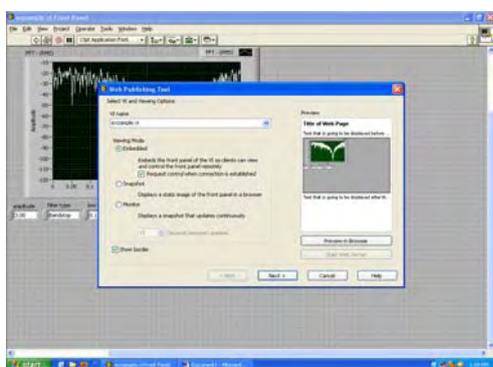

Fig. 6. Select VI and Viewing.

B. Select HTML Output

In the next box: Document title, Header and Footer, whose content is displayed on the website (Fig. 7) have to be filled.
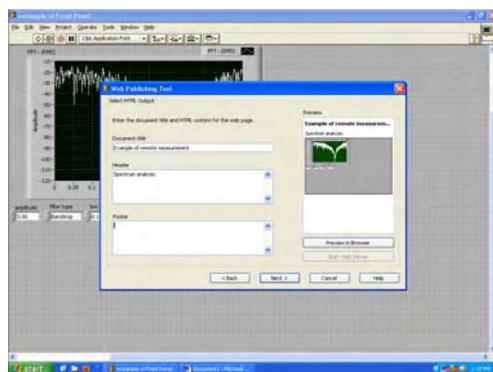

Fig. 7. Select HTML Output.
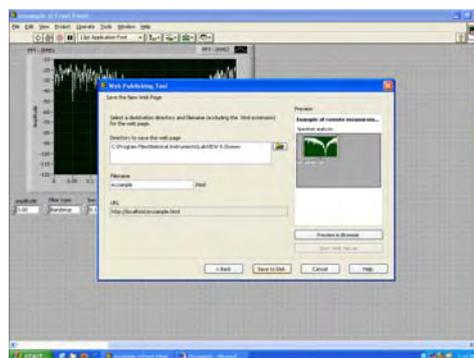
C. Save the New Web Page

Fig. 8. Save the New Web Page.

The last box set Root Directory to the location of the html page, filename and URL. After setting all parameters examined in this new project is saved (Fig. 8).

In earlier versions of LabView is necessary to make adjustments to the html web page code to allow the data to be monitored dynamically:

```
<HTML>
<HEAD>
<TITLE>Example of remote measurement</TITLE>
<meta html-equiv="refresh" content="5">
</HEAD>
<BODY>
....
```

After the changes the page will automatically refresh every 5 seconds.
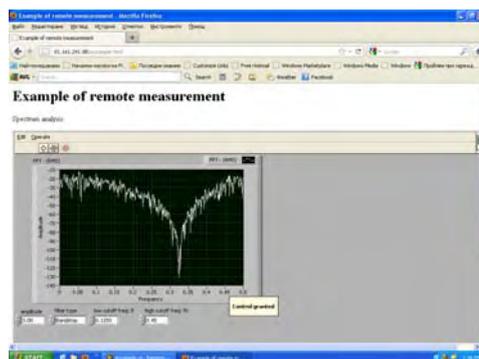

Fig. 9. The virtual instrument for remote monitoring and measurement using computer networks.

Fig. 9 indicated the appearance of the virtual instrument by login in to the page address.

VI. LABORATORY WORK

The aim of the laboratory exercise is to acquaint students with the capabilities of the software LabView for conducting remote measurement. After building a virtual instrument that is suitable for a specific measurement is carried out Web Server and Web Publishing Tool configuration. In case of
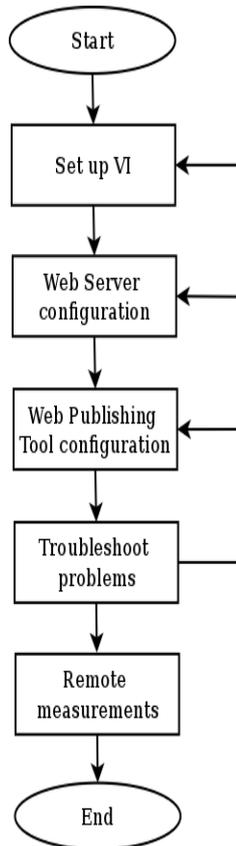
Fig. 10. Sequence of laboratory work.

problems they need to be troubleshoot. After successful completion of all steps students make remote measurements.

VII. CONCLUSION

In this article block diagram for remote control and measurement that use computer networks is suggested. Also it is discussed how the configuration of the LabView Web Server must be set. By means of this server remote control and measurement can be realized.

This proposed system can be used in:

- control and diagnosis of household and industrial sites;
- education for students of different remote processes and functional sites;
- early warning in case of disasters.

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