

VIRTUAL TOOLS FOR EDUCATION

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Abstract: This introduction to the Virtual Workshop presents the scope and recalls some related papers presented in the latest IMEKO World Congress in 2000. Links to relevant documents and files are also included. They are operative during the Workshop, some of them even later on.

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1 INTRODUCTION

The education in measurement technology needs tools. The measurement science is very strongly application minded. One can even say that any science needing experimental knowledge needs measurement science. And every experimental work is done using tools. The real tools of measurement technology are sensors and measuring instruments: meters, indicators, oscilloscopes, etc. Education in measurement technology needs these instruments for studying their use. But it is also very essential to study the principles of their operation. That makes it possible to use the instruments purposefully, to avoid wrong conclusions, and to keep the tools in good condition.

2 VIRTUAL INSTRUMENTS

Modern computers give a possibility to build (often together with sensors and DAQ boards) systems that behave like real measuring instruments. They are called virtual instruments, and there are several software products available for constructing such instruments. Virtual instruments have some benefits that may be valuable for education purposes: they can be configured to represent several types of real instruments, they can be analysed by studying their software and by generating displays that are normally not included in the real instrument, they do not necessarily break down if overloaded, etc. Virtual instruments are used for many purposes. This Workshop discusses some of them. In IMEKO 2000 Numminen and Aumala [1], Dozortsev [2], Nakanishi *et al.* [3], Podgorski and Wisniewski [4], and deRoos and Regtien [5] presented this sort of papers. Numminen's instruments are available for trying. One should open instruments Switching Voltage Source.vi, Scope.vi, DMM.vi and TrueRMS.vi and run them simultaneously

3 OTHER VIRTUAL TOOLS

IMEKO 2000 published also other types of tools. They can be used for working theoretical material (see for example Aumala [6] or Numminen [1]). Aumala's material is a ToolBook application, and the set-up file can be downloaded at http://www.mit.tut.fi/books/perusteet/Welcome_eng.html. The set-up zip produces also a runtime version of the ToolBook. Takayama and Kariya [7] presented a user interface. Muravyov [8] presented a virtual laboratory desk. Sandu [9] presented a virtual laboratory that could be used through the Web. The address of the laboratory was given in the paper. It should be noted, that this laboratory includes also real experiments. Frühauf and Liu [10] presented a bigger education system that is intended to be used during several phases of studies. The idea is that the student programs the experiment, and after simulation a real experiment is made and compared with the previous one. Most virtual tools included some sort of signal processing.

4 DISCUSSION

Virtual technologies give many new possibilities for developing instruments and systems. The technologies are used for routine work in testing laboratories, etc. The education field can have many benefits using these methods, and the educators are already busy in developing new tools. This Workshop presents some of the results and tries to create networks for joint activities.

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