Workshop No 2

Integrated e-Learning with remote experiments for engineering education in the era of networking

Franz Schauer and **Miroslava Ozvoldova**
fschauer@fai.utb.cz, ozvoldova@fai.utb.cz

Tomas Bata University in Zlín, Faculty of Applied Informatics,
CZ-760 05 Zlín, Czech Republic

and University of Trnava, Faculty of Education, Department of Physics,
SK-918 43 Trnava, Slovak Republic

THESIS

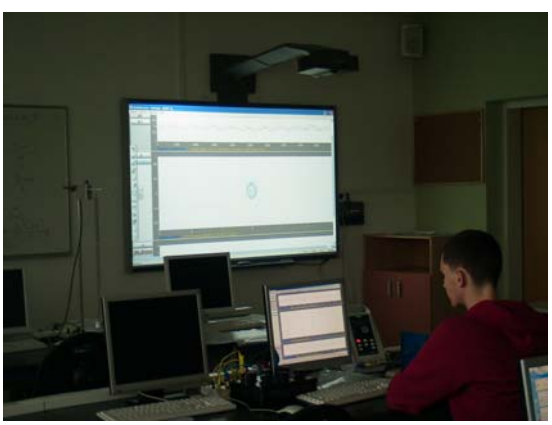
In the workshop, the cross-section of **1st Slovak and 1st Czech Internet Natural Sciences Remote e-Laboratory (INRe-L)** will be presented and the outlines of the existing remote laboratory system with data transfer using Internet School Experimental System (ISES) as hardware and ISES WEB Control kit as software will be given.

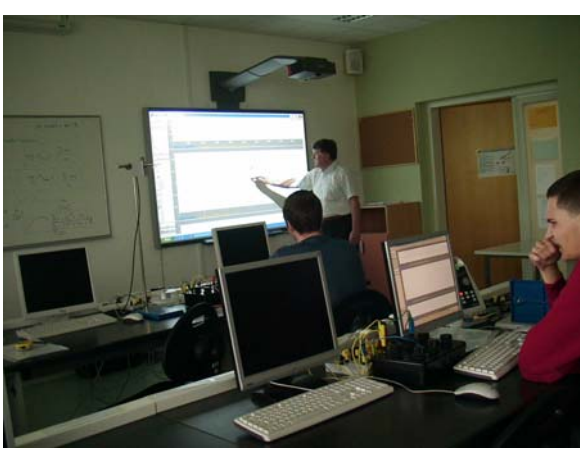
Then, the Integrated e-Learning (INTe-L) as a new strategy of education of physics for engineering education will be presented as a method based on the methodology sciences use for the cognition of the Real world, where **e-laboratory with remote experiments across the Internet play an indispensable part.** The indispensable quality of this method is the active part the student has to take in the teaching process both in lessons, seminars and laboratory exercises, but also his/her substantially increased activity in form of projects, search for information, presentations etc.

The possibilities and intention to set up the **network of Natural sciences e- laboratories of European universities** will be presented.

Thesis

1. MOTIVATION





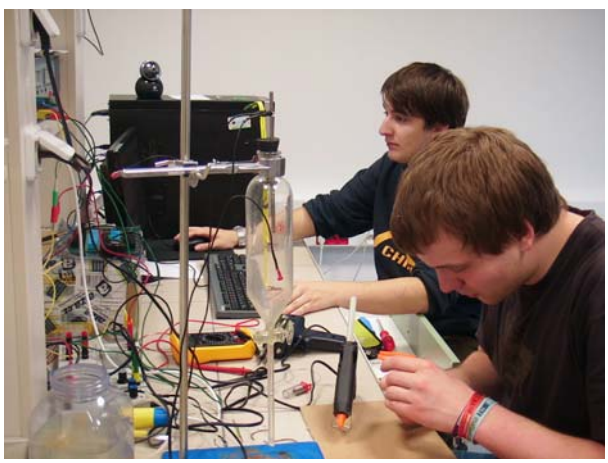
2. CRITERIA FOR BUILDING E- LABORATORY

3. CROSS- SECTION OF 1st Slovak and 1st Czech Internet Natural Sciences Remote e-Laboratory (INRe-L)

The set of remote interactive physics experiments using measuring hardware and software system Intelligent School Experimental System ISES for data collection with corresponding sensing modules with the server-client connection is established by the software "ISES-kit".

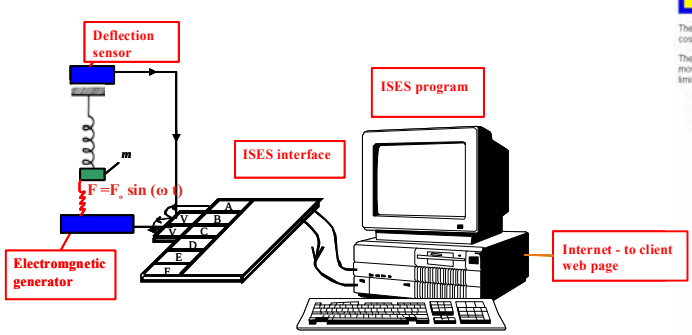
This approach is demonstrated on the Internet available remote experiments from **1st Slovak e-laboratory: Environmental monitoring in Trnava, Eletrochemical cell, Energy transfer in oscillator, Free fall and Mathematical pendulum** (see **http://kf.truni.sk/remotelab**)
and the **1st Czech e-laboratory** (see **www.ises.info**) : **Liquid level control, Environment data in Prague, Forced oscillations on a spring, Faraday law, Solar cell characterization, Diffraction on microobjects.**

4. INTEGRATED e-LEARNING (INTEe-L) INTRODUCTION

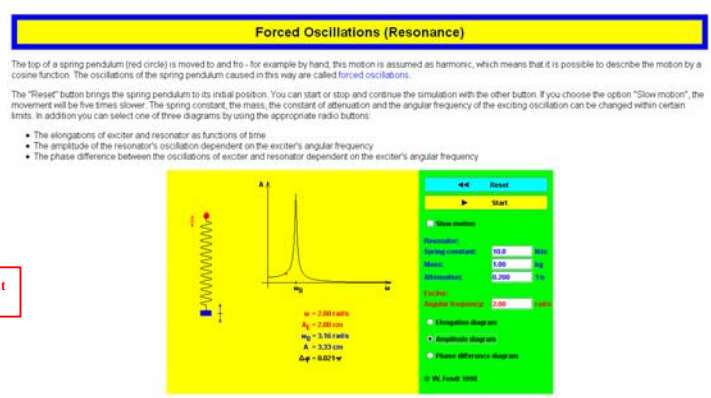


5. BLOCKS OF INTe-L

e-Remote experiments



e- simulations



6. TARGET GROUPS FOR INTe-L

7. OUTLOOK AND GOAL – to setup the network of EU universities

8. DISCUSSION WITH PARTICIPANTS OF WORKSHOP No 2

International Conference REV
KTH, Stockholm, Sweden

1st Slovak Internet Natural Sciences Remote e-Laboratory (INRe-L)

M. Ozvoldova[2)1)], F. Schauer[1)2)], P. Cernansky[1)], Z. Gerhatova[1)], L. Tkac[1)], M. Beno[1)] and F. Lustig[3)]

[1)] Faculty of Informatics, Tomas Bata University in Zlin, T GM sq. 272, Zlin, CZ - 76272, Cech Republic, *e-m:fschauer@ft.utb.cz*
[2)] University of Trnava, Faculty of Pedagogy Department of Physics, Priemyselná 4, SK-918 43 Trnava, Slovak Republic
[3)] Faculty of Mathematics and Physics, Charles University in Prague, Ke Karlovu 3, 121 16 Prague 2, Czech Republic

ABSTRACT

The set of remote interactive physics experiments using measuring hardware and software system Intelligent School Experimental System ISES for data collection with corresponding viewing modules.The server-client connection is established by the software "ISES-kit",

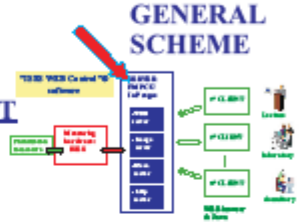
This approach is demonstrated on the Internet available remote experiments from 1st Slovak e-laboratory Environmental monitoring in Trnava, Electrochemical cell, Energy transfer in oscillator, Free fall and Mathematical pendulum (see http://fyzikalne.sk/remotelab) and the 1st Czech e-laboratory (see www.ises.info) : Liquid level control, Environment data in Prague, Forced oscillations on a spring, Faraday law, Solar cell characterization, Diffraction on microobjects.

SOFTWARE and HARDWARE USED
Intelligent School Experimental System

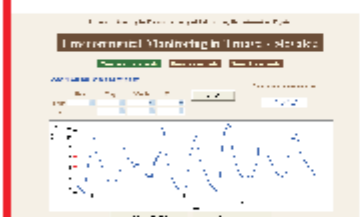
REMOTE PHYSICS EXPERIMENTS

GENERAL SCHEME

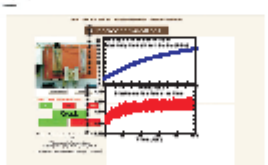
EXPERIMENT



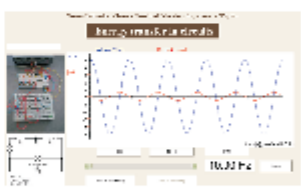
Environmental monitoring
http://remotelab1.truni.sk



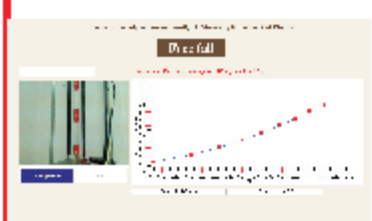
Electrochemical cell
http://remotelab2.truni.sk



Energy transfer in oscillators
http://remotelab3.truni.sk



Free fall
http://remotelab4.truni.sk



Mathematical pendulum
http://remotelab5.truni.sk

1st CZECH E- LABORATORY

WWW.ISES.INFO

Diffraction on microobjects
http://www.ises.info

Author's Biography

Franz Schauer received the M.S. degree in Electronics from the Brno University of Technology in 1963 and his Ph.D. degree in Solid State Physics from Prague University of Technology in 1978. In 1982 he was appointed Associate Professor and in 1988 Professor in Condensed Matter Physics at the Technical Academy in Brno. In 1993-2002 he was with the Faculty of Chemistry, Brno University of Technology and since then he has been with the Polymer Centre of the Faculty of Technology and Faculty of Informatics, Tomas Bata University in Zlin. His main activities are molecular electronics, computer assisted experiments, and e-learning in physics teaching.

Miroslava Ožvoldová is a Head of Department of Physics at the Faculty of Education in Trnava University in Trnava, Slovak Republik. Since 2008 she has been active also at the Department of Mathematics at the Faculty of Applied Information Thomas Bata University in Zlin, Czech Republic.

She Received her M.S. degrees in Physics from Comenius University in Bratislava, Slovakia, in 1973, and 1981 a Ph.D Physics-Mathematics Science. In 1992 she was appointed Associate Professor, and in 2002 extraord. Professor at the Faculty of Materials Science and Technology in Trnava, Slovak University of Technology in Bratislava. Since 2003 she has been active at the University of Trnava, Faculty of Education where she has improved the new educational methods physics and mathematics teaching via Integrated e-Learning strategy. Her main activities are optical properties of chalcogenide and heavy metal optonic glasses.