

# European e-Laboratory Network of Physics Remote Experiments

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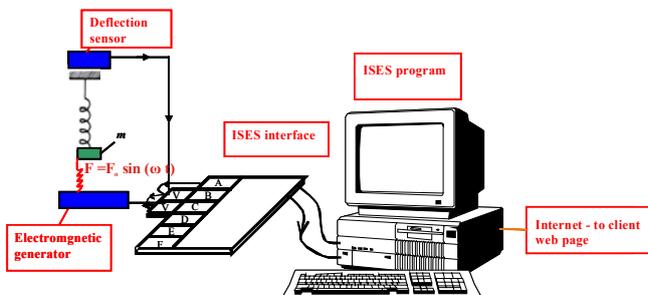
## Abstract

The envisaged project foresees the building of the distributed European e-laboratory of Physics and Natural sciences remote experiments for the support of the teacher in new teaching methods and gaining interest of students in exact sciences by new methods of teaching for the 3<sup>rd</sup> Millennium. The project will full use the already achieved results with the running experiments available on the [www.ises.info](http://www.ises.info) based on the simple technology of server-client and web services using Java applets and web browser.

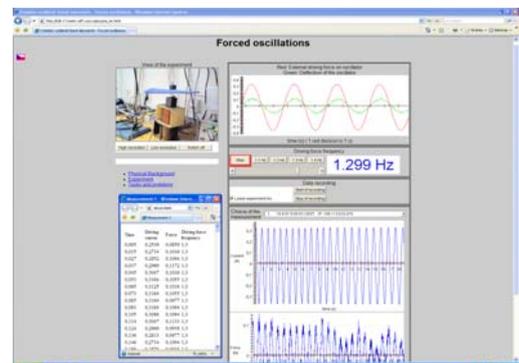
## Project synopsis

The present state of information communication technology made it possible to devise and run computer based e-laboratories accessible to any user with the connection to the Internet, equipped with very simple technical means and making full use of web services (Fig.1 and Fig.2). Thus, the way is opened to a new strategy of education of physics with strongly global features, based on experiment and experimentation, called e-LTR[1], RCL[2] and we named this strategy Integrated e-Learning (INTe-L) [3] and remote experiment across the Internet is the starting point of this strategy based on the simple system with the server-client approach and on the web services and Java applets. We intend to use the already pre-built remote laboratory system with data transfer using Internet School Experimental System (ISES) as hardware and ISES WEB Control kit as software (see [www.ises.info](http://www.ises.info)) [4]. This approach enables the simple construction of remote experiments without building any hardware and virtually no programming, working with paste and copy approach of pre built typical blocks as camera view, controls, graphs, displays etc. We set up and operate at present 7 experiments, running round the clock, with more than 16 000 connections since 2005. The experiments are widely used in practical teaching on both university and secondary level of teaching of physics. The recording of the detailed steps the experimentator takes during the measurement enable a detailed study of psychological aspects of running experiments.

Total number of online connections to RE from start of monitoring till April 2008						
Water level IV /2004	Meteorology in Prague XII /2005	Electromag. induction X/2006	Natur.driven oscillations X /2006	Solar energy conversion X /2006	Diffraction microobj. VI /2007	$\Sigma$
3848	4827	3 241	1 498	1 843	1128	<b>16 385</b>



**Figure 1.** The schematic representation of the server of the remote experiment “Natural and driven oscillations ” with mass and spring using the system ISES.



**Figure 2.** The web page of the experiment Natural and driven oscillations with live web camera view, frequency controls, measured data and the graph of the measured data

The goal of the proposal is to setup a project with the aim of the building of the distributed European e-laboratory of remote experiments for the support of the teachers in new teaching methods and gaining interest of students in exact sciences by new methods of teaching of Physics and Natural sciences for the 3<sup>rd</sup> Millennium.

The proposal is open to every interested institution and the easy access to the both ISES hw and WEB ISES CONTROL kit sw is guaranteed, providing the access to the sophisticated technology and know how.

### Literature

[1] THOMSEN C., JESCHKE S., PFEIFFER O. AND SEILER R. e-Volution: *eLTR -Technologies and Their Impact on Traditional Universities* in Proceedings of the Conference: EDUCA, ISWE GmbH, Berlin, 2005.

[2] JODL, H. J. a kol: *RCL- Remote controled Lab*, Technische Universität Kaiserslautern, /rcl.physik.uni-kl.de/.

[3] SCHAUER, F., OZVOLDOVA, M., LUSTIG , F. AND DEKAR, M.: *Real Remote Mass-Spring Laboratory Experiments across Internet-Inherent Part of Integrated E- Learning of Oscillations*, International Journal of Online Engineering (iJOE) 4, No.2, (2008) pp. 52-55.

[4] SCHAUER, F., LUSTIG, F., DVOŘÁK, J. and OŽVOLDOVÁ, M.: *Easy to Build Remote Laboratory with Data Transfer using ISES – Internet School Experimental System*, to *Eur. J. Phys* 29 (2008).

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