



The VISIR™ Open Lab Platform Puts Your Laboratories Online

Blekinge Institute of Technology (BTH) in Sweden has created a laboratory workbench equipped with a unique remote control interface, enabling students to perform physical experiments at home or elsewhere. “Mouse-cursor-on” experiments supplement hands-on ones. For example, students can repeat exercises after a regular laboratory class. Off-campus students can participate actively in regular supervised classes. A short video clip demonstrates how electronics experiments are performed, <http://openlabs.bth.se/static/video/Opamp.html>.



Invitation

A project, VISIR™ (Virtual Instrument Systems In Reality), has been started to disseminate methods to open laboratories for remote experimentation. This is an invitation to

- join the VISIR™ Community and sign up to SIG VISIR, <http://www.online-engineering.org/>
- set up a VISIR™ workbench for electrical experiments and offer remote access for your students
- participate in the further development of this VISIR™ Open Lab Platform

It is an opportunity of providing students with free experimentation resources 24/7 without substantial increase in cost per student. Spending more time on experiments your students will become true experimenters being able to design goods and services complying with the requirements of a sustainable society. Apart from BTH the following six universities FH Campus Wien in Austria, University of Deusto in Spain, Carinthia University of Applied Sciences in Austria, National University for Distance Education in Spain, School of Engineering – Polytechnic of Porto in Portugal, and Indian Institute of Technology Madras in India have set up VISIR™ laboratories and use them in their own laboratory courses. The College North Atlantic Qatar is setting up a laboratory and more organizations are in the pipe. The VISIR™ software is released under a GNU GPL license. The instruments and LabVIEW, which is also required, can be bought from National Instruments. The telemanipulator needed for circuit wiring is commercially available as well. Please contact Ingvar Gustavsson, ingvar.gustavsson@bth.se for more information.

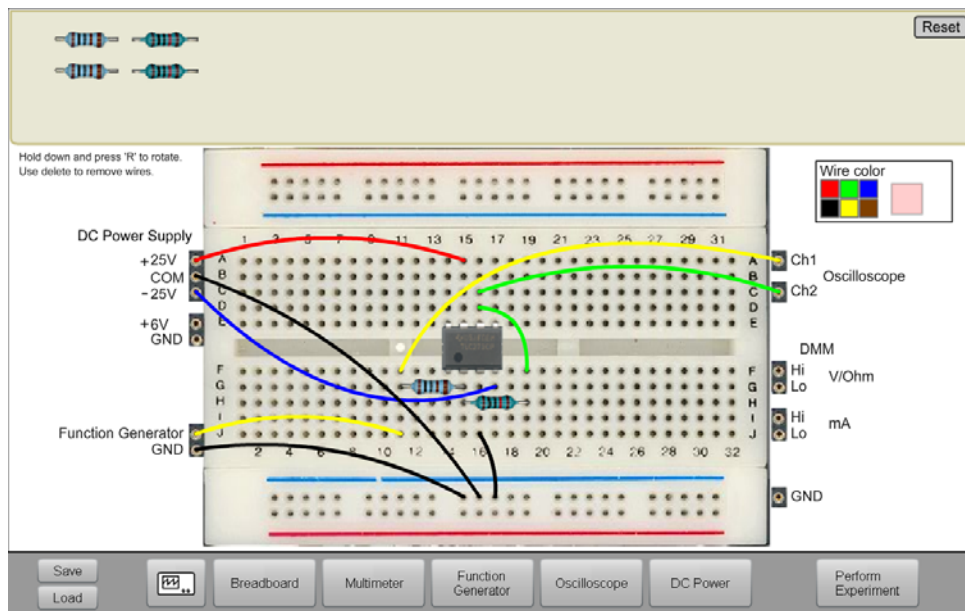
Many students can perform physical experiments simultaneously

The workbench is equipped with a unique virtual interface enabling students to recognize the desktop instruments and the breadboard they have already used in the hands-on laboratory on their own computer screen. The physical breadboard, widely used in electronics laboratories, cannot be controlled remotely. It has been replaced by a telemanipulator, i.e. a relay switching matrix, which the student can control by wiring on a virtual breadboard. This breadboard and an example of a virtual instrument front panel displayed on a student’s computer screen are shown in the figures below. When the user has made all wiring and setting of the instruments she presses the *Perform Experiment* button to send them to the workbench, which creates the desired circuit and performs the experiment in fractions of a second. The result is returned to the user. A time-sharing scheme allows many users to experiment simultaneously i.e. the workbench is equivalent of a laboratory equipped with many traditional workbenches. The VISIR™ Lab

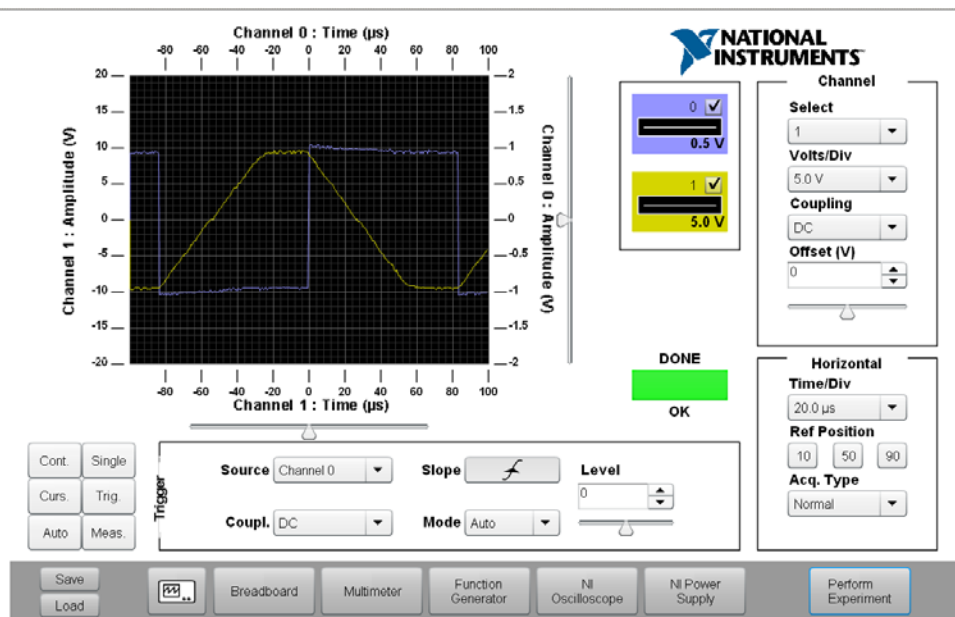
Platform is presented in many scientific papers, for example, <http://www.online-journals.org/index.php/i-joe/article/viewFile/504/412>, <http://online-journals.org/index.php/i-jep/article/view/1589>.

Only a web browser is required

Only Internet access and a web browser are required to access the experimental resources. The client software is automatically downloaded from a web server. The equipment provided comprises a dual channel oscilloscope, a function generator, a DMM, a triple DC power supply, the switching relay matrix, and a number of components such as resistors, IC circuits etc. installed in the matrix. As in a hands-on class, every student is provided with a set of components in each laboratory class. The set is displayed in a component box on the top of the virtual breadboard. The BTH workbench for electrical experiments can be found at <http://openlabs.bth.se/> and is open for guest users to try out.



A user has wired an operational amplifier circuit on the virtual breadboard



Virtual front panel of the oscilloscope showing the slew rate