CALMet Online 2016

The VISIR + project
The remote lab VISIR as a resource to online education

IPP/ISEP
Ricardo Costa (rjc@isep.ipp.pt)

Co-funded by the Erasmus+ Programme of the European Union

Outline

1. The VISIR + project

2. The VISIR system
    1.1 Web access
    1.2 Experiments preparation
    1.3 Hardware, connections and *MaxLists*
    1.4 Users and circuits

3. Demo

4. Hands-on training

The VISIR + project

Brief introduction

The VISIR + project

The VISIR + project targets the area of Electrical & Electronics Engineering, and, within it, the subject of circuit theory & practice.

The nature of each experiment (hands-on, virtual, real-remote) has an impact on the students' perception of circuits' behaviour, being therefore mandatory to understand how these different learning objects can be arranged together in order to scaffold their understanding and increase their laboratory-based skills.

The VISIR + project aims to define, develop and evaluate a set of educational modules comprising hands-on, virtual, and remote experiments, the later supported by a **remote lab named VISIR.**

The VISIR remote lab is the focus of this presentation !

Project Consortium

VVISIR+

Deusto
Universidad de Deusto
University of Deusto

UNED

BLEKINGE TEKNISKA HÖGSKOLA · BTH ·

POLITÉCNICO DO PORTO

VISIR+

CARINTHIA UNIVERSITY OF APPLIED SCIENCES
FACHHOCHSCHULE KÄRNTEN

UNSE
Universidad Nacional de Santiago del Estero

IRICE
CONICET
UNR

UNIVERSIDAD NACIONAL DE ROSARIO
UNR Universidad Nacional de Rosario

ABENGE
Associação Brasileira de Ensino de Engenharia

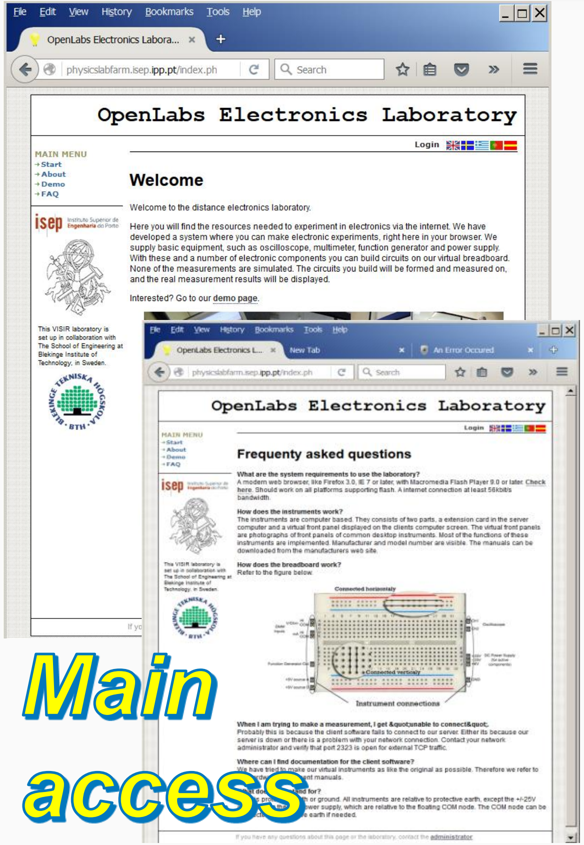
Pontifícia Universidade Católica do Rio de Janeiro

UNIVERSIDADE FEDERAL DE SANTA CATARINA

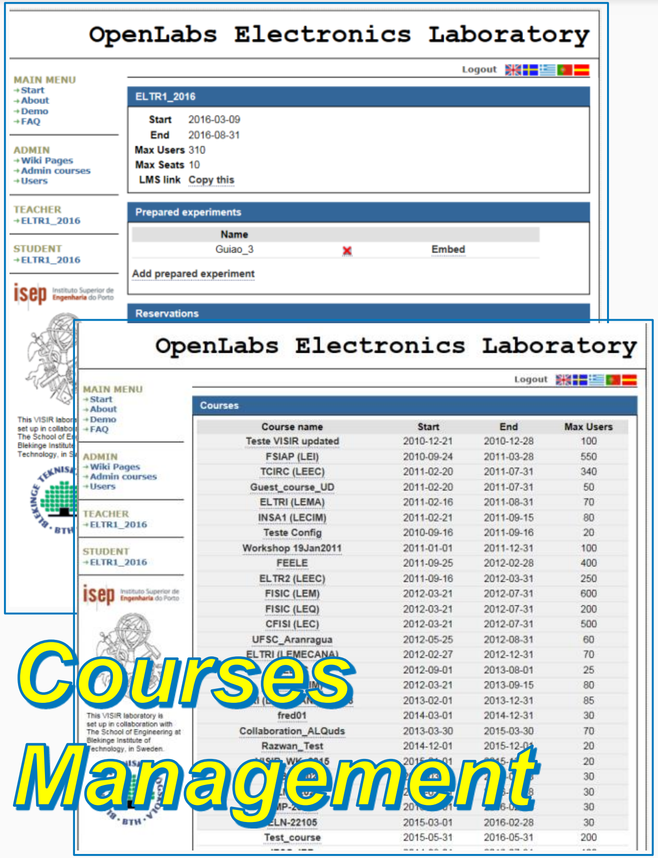
INSTITUTO FEDERAL SANTA CATARINA

Introduction to VISIR system

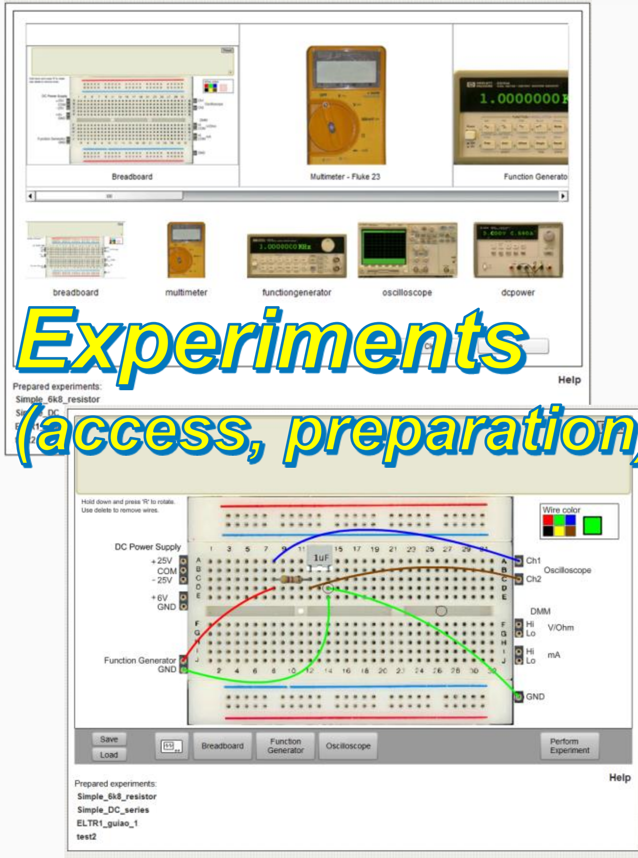
Introduction to VISIR (web access)



Main access



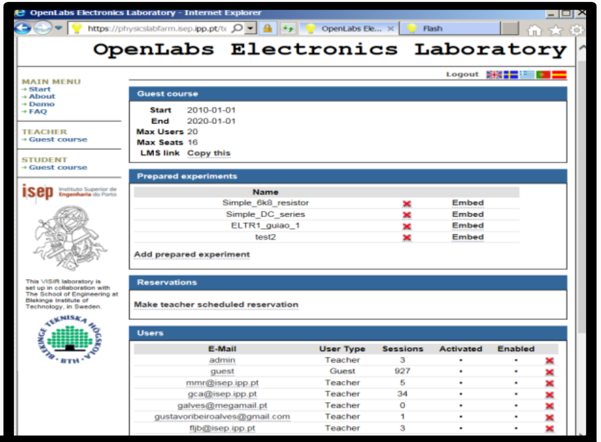
Courses Management



Experiments (access, preparation)

Introduction (experiments preparation)

Course management



***MaxList* file (*.max)**

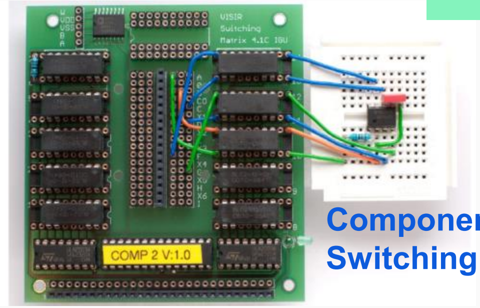
VFGENA_FGENA1 A 0 max:6
VDCCOM_1 0
R_R1_10 B C 470
C_C2_9 E I 1u

SHORTCUT_S1_5 F 0
SHORTCUT_S1_14 A B
SHORTCUT_S2_6 G 0
SHORTCUT_S2_7 F G
SHORTCUT_S3_13 C E
SHORTCUT_S4_6 I G

***Component List* file (*.list)**

SHORTCUT_1_4 B I
SHORTCUT_1_5 F 0
SHORTCUT_1_11 0 C
SHORTCUT_1_12 H 0
SHORTCUT_1_13 A
SHORTCUT_1_14 A
SHORTCUT_2_1 G H

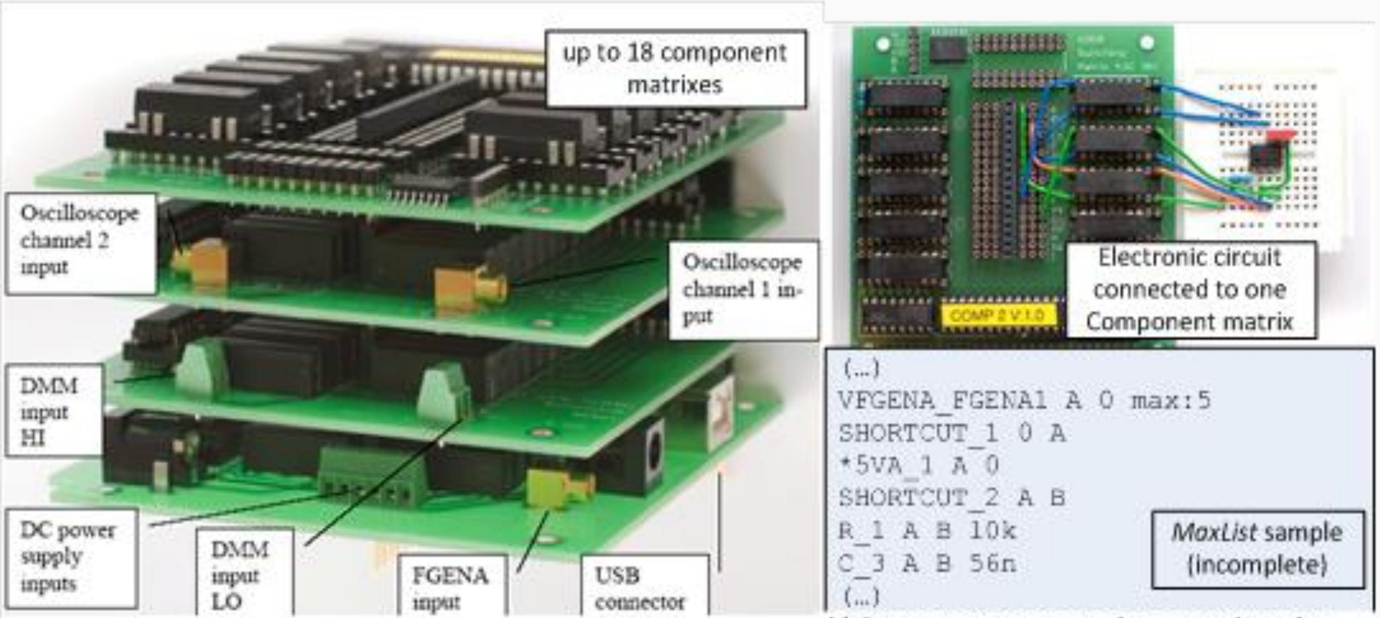
SHORTCUT_1_4 B I
SHORTCUT_1_5 F 0
SHORTCUT_1_11 0 C
SHORTCUT_1_12 H 0
SHORTCUT_1_13 A G
SHORTCUT_1_14 A B
SHORTCUT_2_1 G H



Components attached to a Switching Matrix

Introduction (Hardware, connections and *MaxLists*)

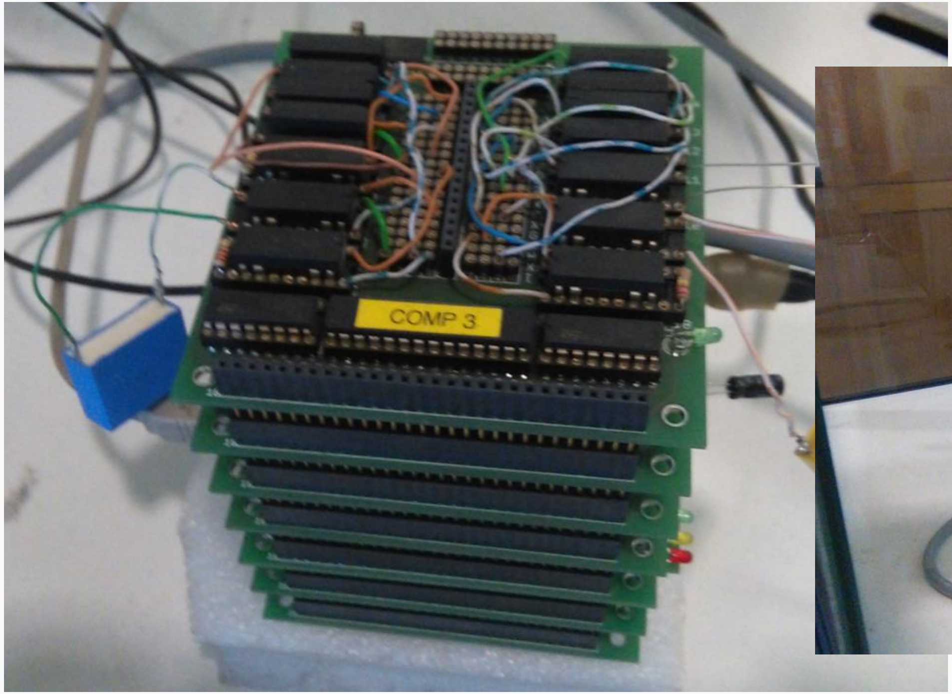
These rules must be defined according to the available hardware connections defined in the *ComponentList* file

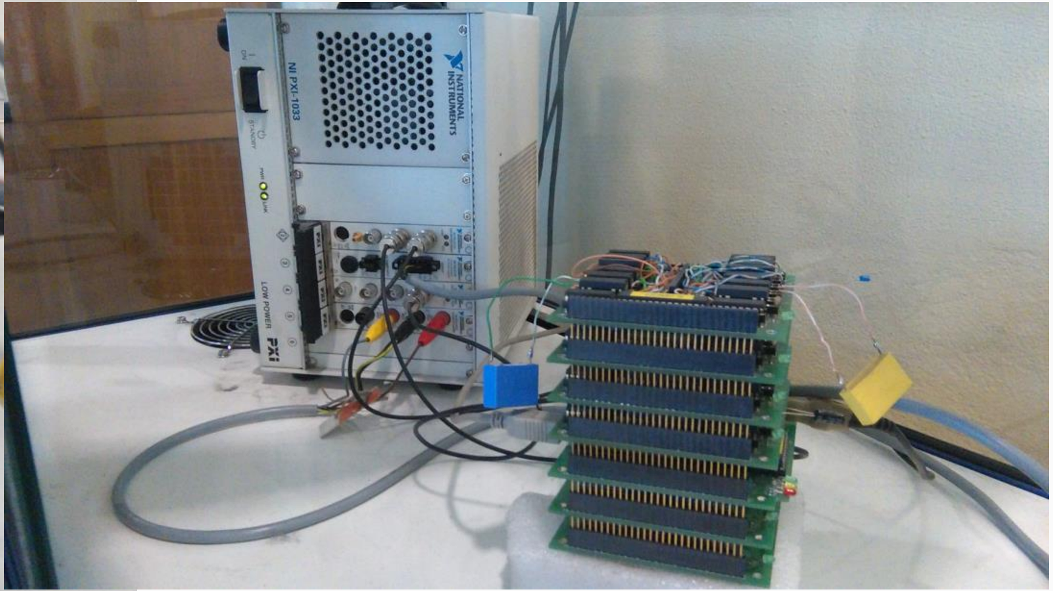


a) Example of switching matrixes

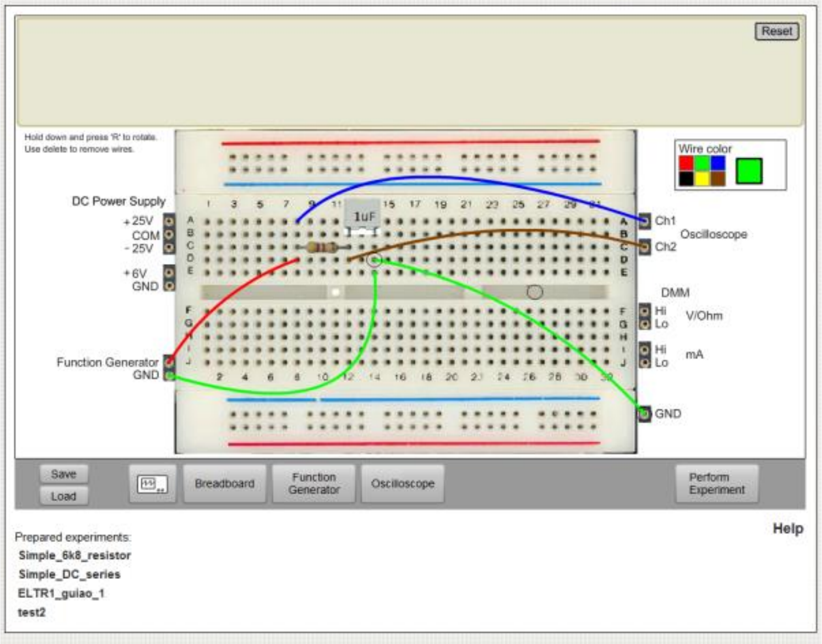
b) Components connected to a matrix and a *MaxList* file sample

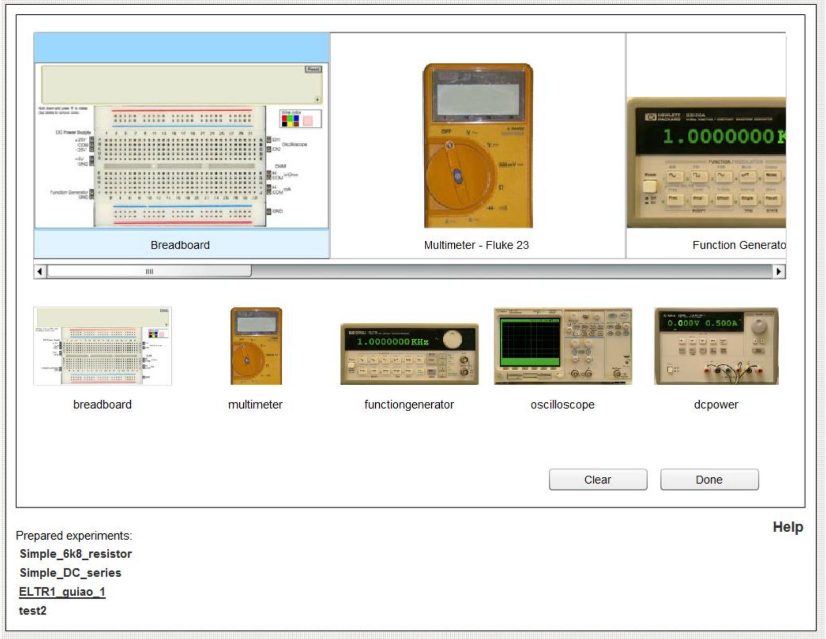
Pictures of the VISIR system installed at ISEP





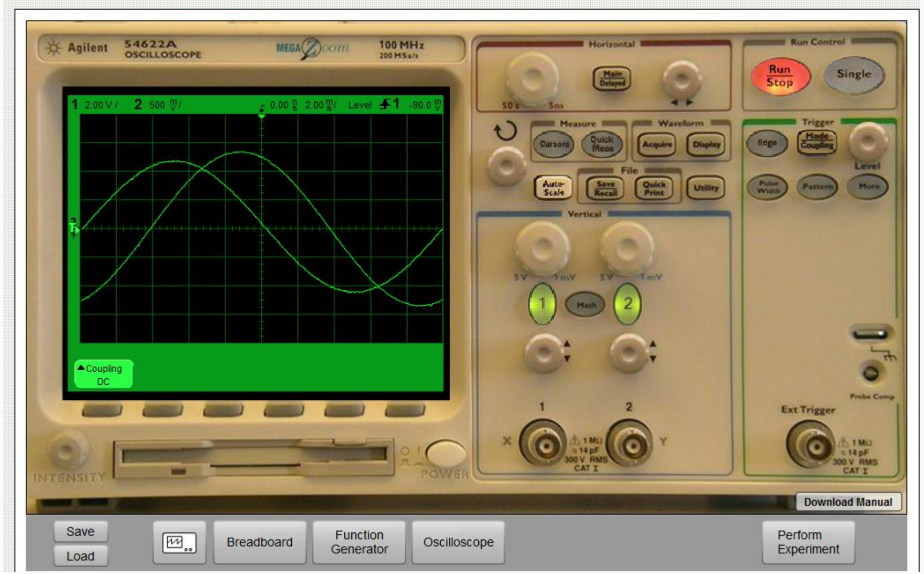
Virtual breadboard and instrument selection using the VISIR

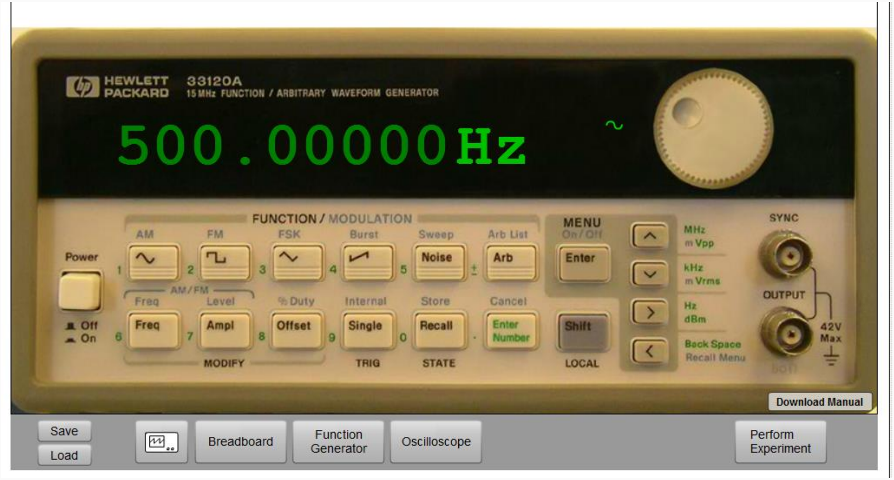




Introduction (Users and circuits)

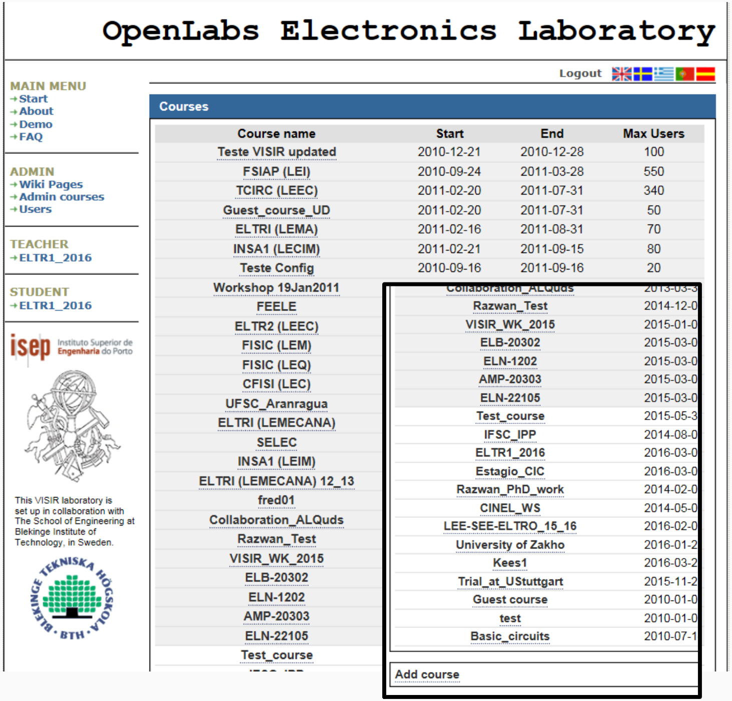
Instruments interfaces used during a remote experiment using VISIR

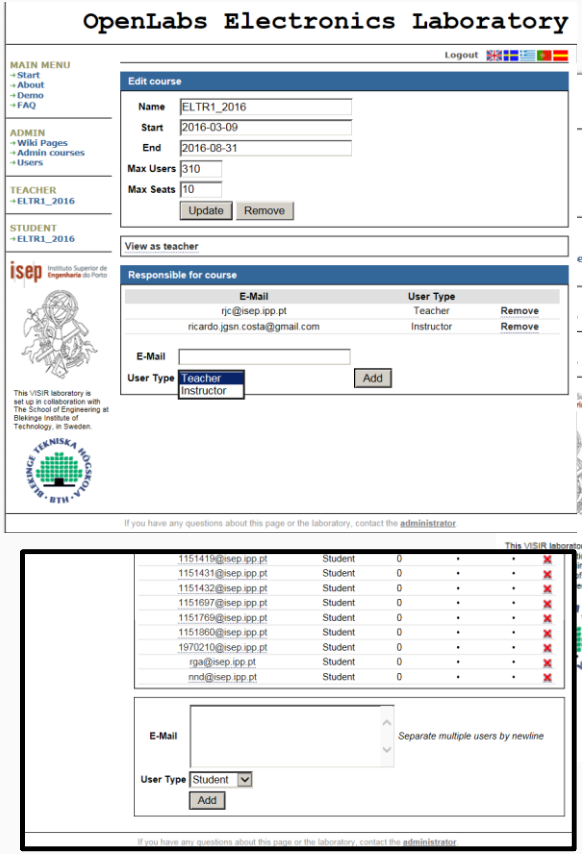


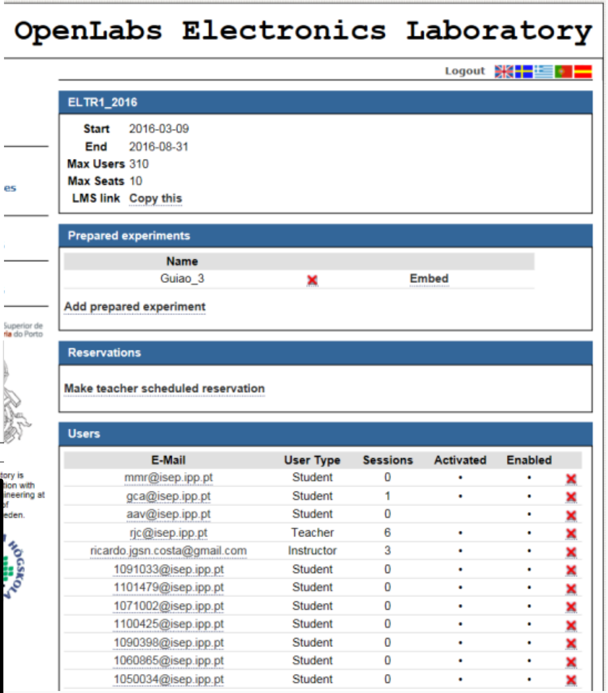


Introduction (Users and circuits)

Course management





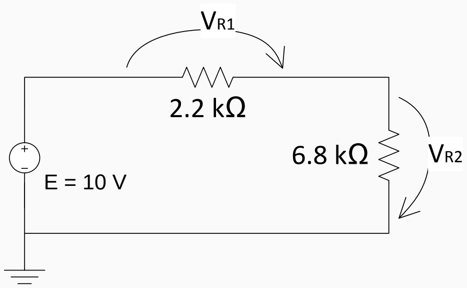


Demo

Demo (circuit 1)

Web access: www.physicslabfram.isep.ipp.pt (Course:*TA_VISIR*; Name:*TA_demo1*)

Serial resistor circuit

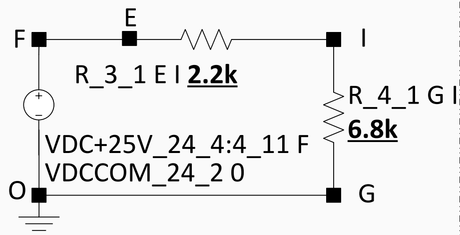


MaxList

VDC+25V_24_4:4_11 F
VDCCOM_24_2 0

R_3_1 E I 2.2k
R_4_1 G I 6.8k

SHORTCUT_3_14 E F
SHORTCUT_2_6 G 0



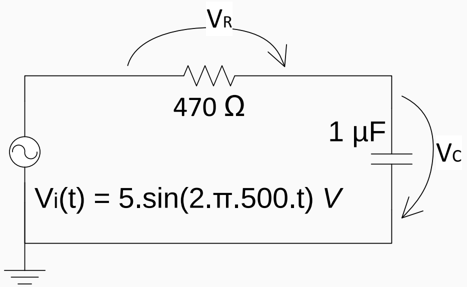
MaxList defined according to the following nodes using the available components connections specified in the *componentList* file.

1. Observe the value of each resistor using the interface and confirm it with the DMM;
2. Selecting the +25 V DC power, setup the circuit in the virtual breadboard and connect the outputs +25V and COM to the circuit (connect the COM to the GND).
3. Connect the DMM and measure the voltage in each resistor;
4. Connect the DMM to measure the current in the circuit; a)Place the DMM between the voltage source and the resistor; b) Place the DMM between both resistors and observe that there is an error (verify the rules defined in the *MaxList* file that is also available in Annex C);
5. Swap the resistors and observe that there is an error (rules defined in the *MaxList* file also available in Annex C).

Demo (circuit 2)

Web access: www.physicslabfram.isep.ipp.pt (Course:*TA_VISIR*; Name:*TA_demo2*)

Serial RC circuit

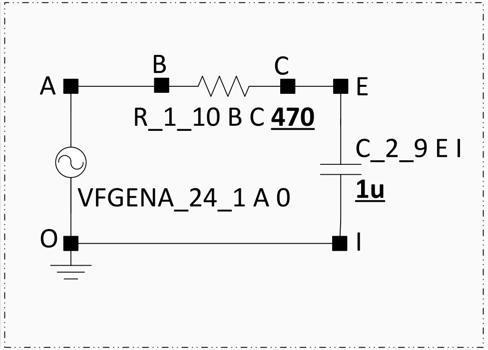


MaxList

VFGENA_24_1 A 0

R_1_10 B C 470
C_2_9 E I 1u

SHORTCUT_3_13 C E
SHORTCUT_1_14 A B
SHORTCUT_3_6 0 I



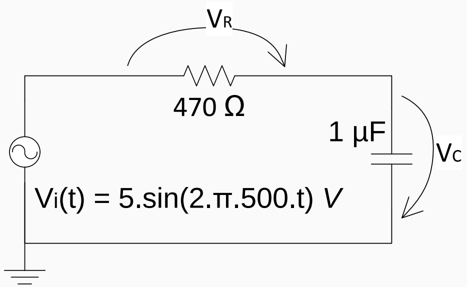
MaxList defined according to the following nodes using the available components connections specified in the *componentList* file.

1. Observe the value of each component using the interface and confirm the value of the resistor with the DMM;
2. Setup the circuit in the virtual breadboard and adjust the voltage and the frequency levels of the Function Generator as indicated;
3. Confirm the adjusted voltage and frequency levels using the Oscilloscope.
4. Connect the terminals of the Oscilloscope to observe simultaneously the signal generated by the function generator, vi(t), and the signal in the capacitor, vc (t) (test the different buttons available in the oscilloscope);
5. Adjust the Oscilloscope as you traditionally do in a hands-on laboratory to calculate the gap between both signals;

Demo (circuit 2)

Web access: www.physicslabfram.isep.ipp.pt (Course:*TA_VISIR*; Name:*TA_demo2*)

Serial RC circuit

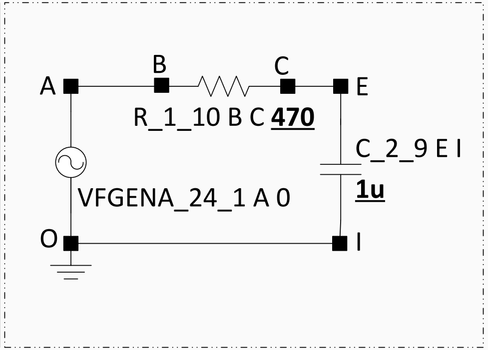


MaxList

VFGENA_24_1 A 0

R_1_10 B C 470
C_2_9 E I 1u

SHORTCUT_3_13 C E
SHORTCUT_1_14 A B
SHORTCUT_3_6 0 I



MaxList defined according to the following nodes using the available components connections specified in the *componentList* file.

6. Do not connect the instruments' grounds and observe if there is any error;
7. Verify the restrictions imposed by the VISIR to observe simultaneously the signals in the resistor, vr(t), and in the capacitor vc(t);
8. Swap the positions of R and C components and observe the generated error (verify the rules in the *MaxList* file that is also available in Annex C);
9. Using the DMM, measure the voltages and the currents in the circuit.

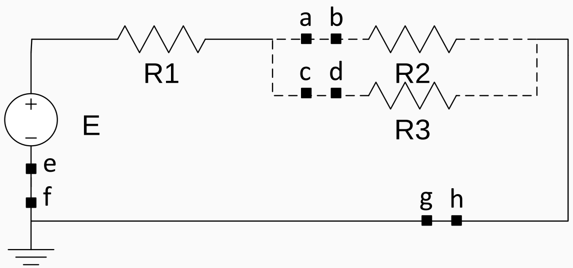
Using VISIR: Hands-on

You are invited to use the VISIR system available at ISEP
Web: https://physicslabfarm.isep.ipp.pt/index.php?sel=guestlogin
Log: guest@user.pt
Pass: guestuser

Co-funded by the Erasmus+ Programme of the European Union

Circuit 1: DC serial and parallel circuits

Web access: www.physicslabfram.isep.ipp.pt (Course:*TA_VISIR*; Name:*TA_circuit1*)

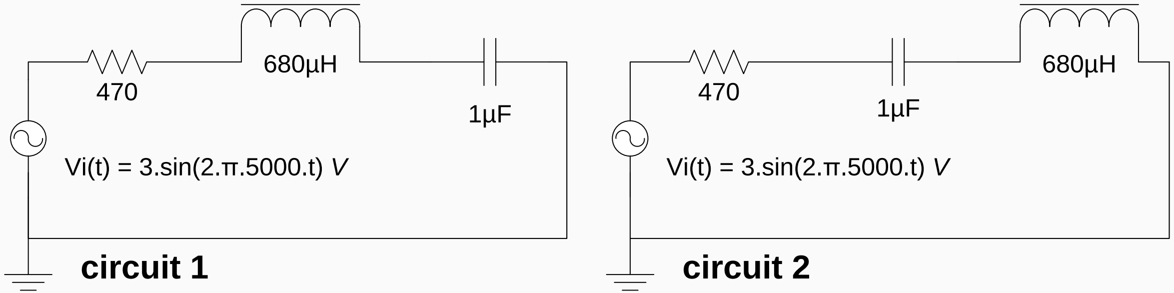


Available resistors			
R1 [Ω]	1.0k	470	22k
R2 [Ω]	2.2k	open	
R3 [Ω]	82k	open	

1. Setup one circuit in the breadboard according to the available resistors in the table;
2. Selecting the DC power, connect the outputs +6V and GND to the circuit;
3. Adjust the voltage source to E=6 V and confirm the value using the DMM;
4. Using the DMM measure the currents in the different branches of the circuit (note: if you try to measure the currents between the indicated points a-b, c-d, e-f or g-h an error will be generated - see the MaxList file in the Annex C -);
5. Using the DMM measure the voltage in each component;
6. Repeat this analysis to the other circuits able to setup according to the possibilities indicated in the table.

Circuit 2: Serial RLC

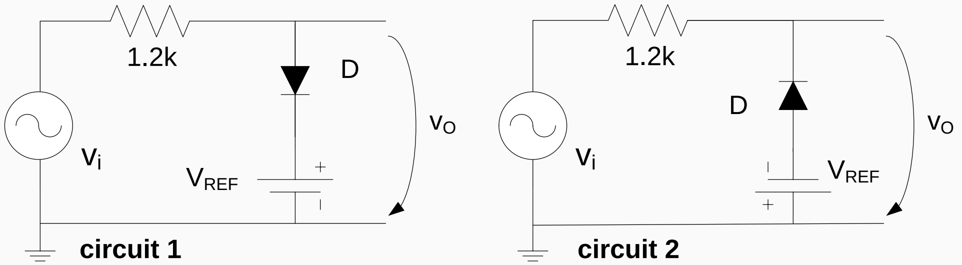
Web access: www.physicslabfram.isep.ipp.pt (Course:*TA_VISIR*; Name:*TA_circuit2*)



1. Setup circuit 1 and adjust Vi(t) to the indicated values;
2. Using both channels of the oscilloscope confirm and visualize Vi(t) and Vc(t);
3. Using the DMM measure the RMS current in the different branches;
4. Using the DMM measure the RMS voltage in each component;
5. Setup circuit 2 and adjust the Vi(t) to the indicated values;
6. Using both channels of the oscilloscope confirm and visualize Vi(t) and VL(t);
7. Using the DMM measure the RMS current in the different branches;
8. Using the DMM measure the RMS voltage in each component.

Circuit 3: Limiting circuits with diodes

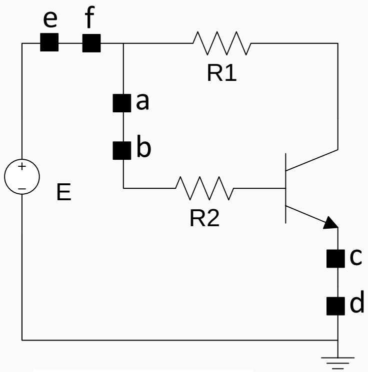
Web access: www.physicslabfram.isep.ipp.pt (Course:*TA_VISIR*; Name:*TA_circuit3*)



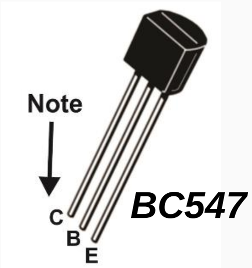
1. Setup circuit 1 and adjust the Function Generator to Vi=5.sin(2.pi.5000.t) V and confirm that value using the Oscilloscope;
2. Selecting the DC power, connect the outputs +25V and COM to the circuit (connect the COM to the GND), and adjust VREF=2 V. Confirm that value using the DMM;
3. Visualize Vi and Vo simultaneously using the Oscilloscope;
4. Change VREF and verify that the commutation point of the diode changes;
5. Setup circuit 2 and repeat steps 2, 3 and 4.

Circuit 4: Circuit with BJT – DC operating point

Web access: www.physicslabfram.isep.ipp.pt (Course:*TA_VISIR*; Name:*TA_circuit4*)



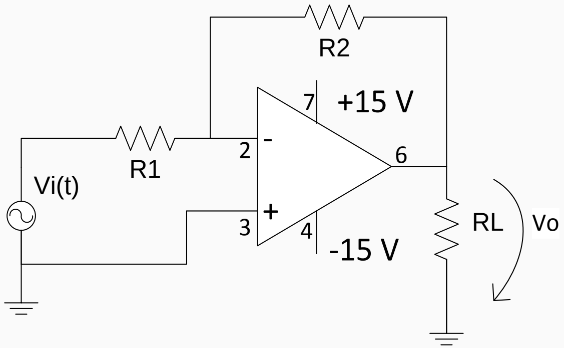
1. Setup the circuit, connect the DC power outputs +6V and COM (connect the COM to the GND), and adjust to E=6 V. Confirm that value using the DMM;
2. Using the DMM, fill-in the following table and evaluate the current state of the BJT (active, saturation or cut-off); (note: you can only measure currents between points a-b, c-d and e-f. Observe the MaxList file in Annex C.)



R1	R2	E	IC	IE	IB	VCE	VBE	VBC	state
6k8	22k	6 V							

Circuit 5: Amp-op Inverter Circuit

Web access: www.physicslabfram.isep.ipp.pt (Course:*TA_VISIR*; Name:*TA_circuit5*)



R1= 100 k

R2 = 100 k or 220 k

RL = 2.2 k

E = 6.sin(2.π.5000.t) V

1. Setup the circuit in the virtual breadboard changing R2 according to the values indicated in the table.
2. Using the Function Generator adjust the Vi voltage according to the indicated in the figure and, using the Oscilloscope, verify the amplitude and the frequency;
3. Using the Oscilloscope observe Vi and Vo of the circuit;
4. Using the DMM measure the RMS:

   - voltage in the different components;

   - current in the load.

Thank you for your attention!

Co-funded by the Erasmus+ Programme of the European Union