



CALMet Online 2016

The VISIR + project

The remote lab VISIR as a resource to online education

IPP/ISEP

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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 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 !



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Introduction to VISIR system

The screenshot shows the main page of the OpenLabs Electronics Laboratory. It features a navigation menu with options like Start, About, Demo, and FAQ. A central 'Welcome' message is displayed, along with a brief description of the lab's purpose: to provide a distance electronics laboratory experience through the internet. It mentions the use of various electronic components and instruments like oscilloscopes, multimeters, and function generators.

This screenshot displays the 'Frequently asked questions' section of the website. It addresses common queries such as 'What are the system requirements to use the laboratory?', 'How does the instruments work?', and 'How does the breadboard work?'. It includes a diagram of a breadboard with various electronic components connected, illustrating the experimental setup.

Main access

This screenshot shows the course management interface. It includes a 'MAIN MENU' with options like Start, About, Demo, and FAQ. The current course is 'ELTR1_2016', with details such as 'Start: 2016-03-09', 'End: 2016-08-31', 'Max Users: 310', and 'Max Seats: 10'. There is a section for 'Prepared experiments' with a table listing experiments like 'Guiao_3' and an 'Add prepared experiment' button.

This screenshot displays the 'Courses' page, which lists various courses available in the laboratory. The table below shows the details for each course:

Course name	Start	End	Max Users
Teste VISIR updated	2010-12-21	2010-12-28	100
FSIAP (LEI)	2010-09-24	2011-03-28	550
TCIRC (LEEC)	2011-02-20	2011-07-31	340
Guest_course_UD	2011-02-20	2011-07-31	50
ELTRI (LEMA)	2011-02-16	2011-08-31	70
INSA1 (LECIM)	2011-02-21	2011-09-15	80
Teste Config	2010-09-16	2011-09-16	200
Workshop 19Jan2011	2011-01-01	2011-12-31	100
FEELE	2011-09-25	2012-02-28	400
ELTR2 (LEEC)	2011-09-16	2012-03-31	250
FISIC (LEM)	2012-03-21	2012-07-31	600
FISIC (LEQ)	2012-03-21	2012-07-31	200
CFISI (LEC)	2012-03-21	2012-07-31	500
UFSC_Aranragua	2012-05-25	2012-08-31	60
ELTRI (EMECANIA)	2012-02-27	2012-12-31	70
fred01	2012-09-01	2012-12-31	25
Collaboration_ALGuDs	2013-03-30	2015-03-30	70
Razwan_Test	2014-12-01	2015-12-31	20
Test_course	2015-05-31	2016-05-31	200

Courses Management

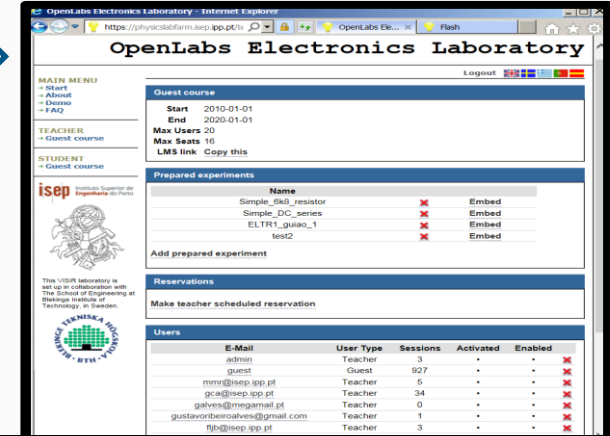
This screenshot shows the 'Experiments' section of the website. It features a grid of images representing different experimental setups and equipment, including a breadboard, a multimeter (Fluke 23), a function generator, and various electronic components like resistors and capacitors.

Experiments (access, preparation)

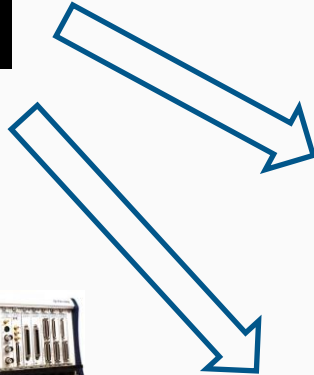
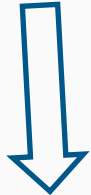
This screenshot displays a detailed view of a breadboard circuit simulation. It shows a breadboard with various components connected, including a function generator, a DC power supply, and an oscilloscope. The oscilloscope displays waveforms for different channels (CH1, CH2) and a DMM (Digital Multimeter) shows a reading of 1.000000. The interface includes controls for saving and loading experiments.



Course management



Component List file (*.list)



MaxList file (*.max)

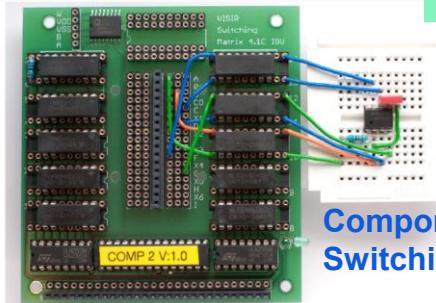
VFGENA_FGENA1 A 0 max:6
VDCCOM_10

R_R1_10 B C 470

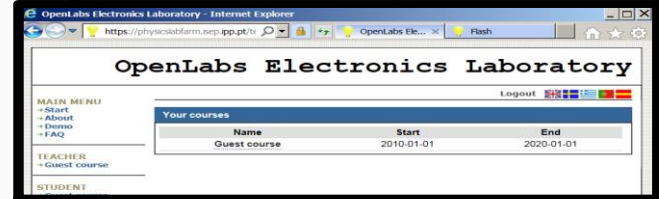
C_C2_9 E I 1u

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

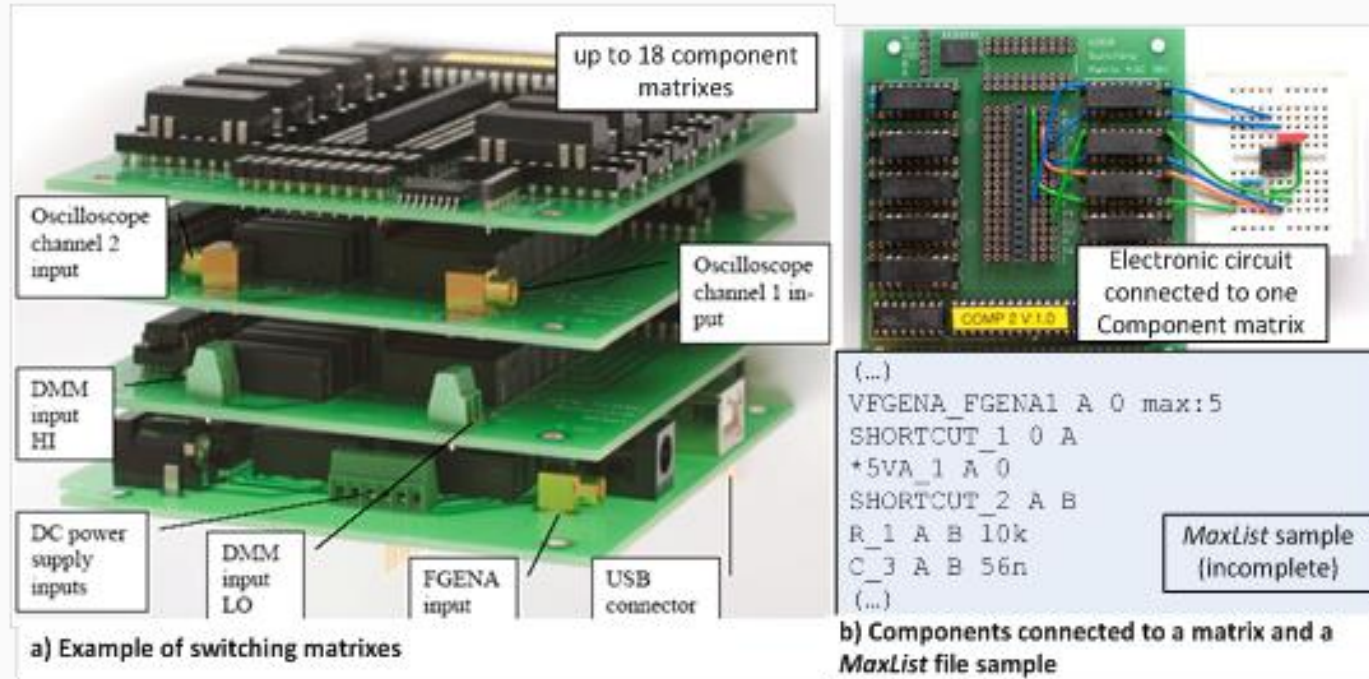
SHORTCUT_1_4 B I
SHORTCUT_1_5 F 0
SHORTCUT_1_11 0 C
SHORTCUT_1_12 H 0
SHORTCUT_1_13 A
SHORTCUT_1_14 A
SHORTCUT_2_1 G F
SHORTCUT_1_4 B I
SHORTCUT_1_5 F 0
SHORTCUT_1_11 0 C
SHORTCUT_1_12 H 0
SHORTCUT_1_13 A G
SHORTCUT_1_14 A B
SHORTCUT_2_1 G H



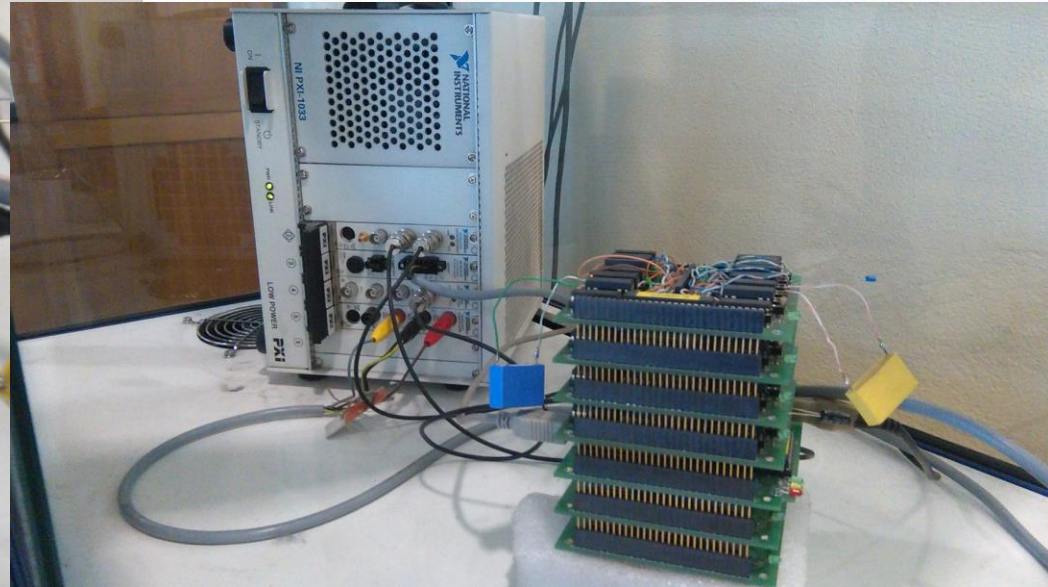
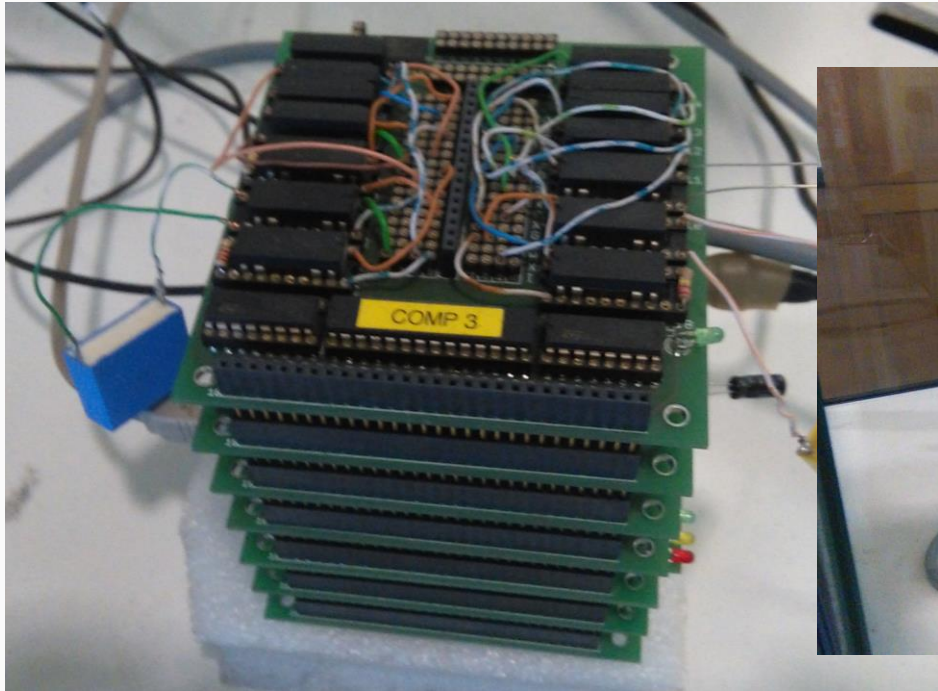
Components attached to a Switching Matrix



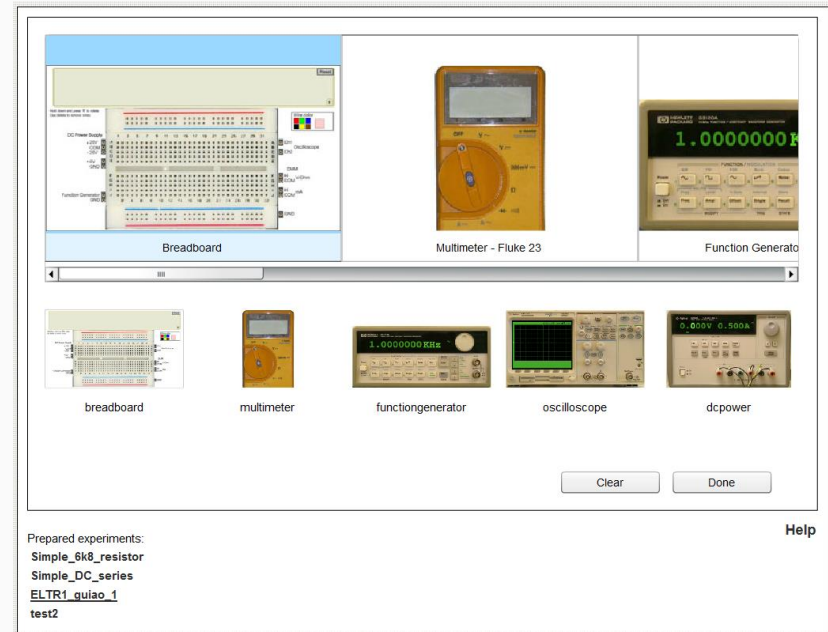
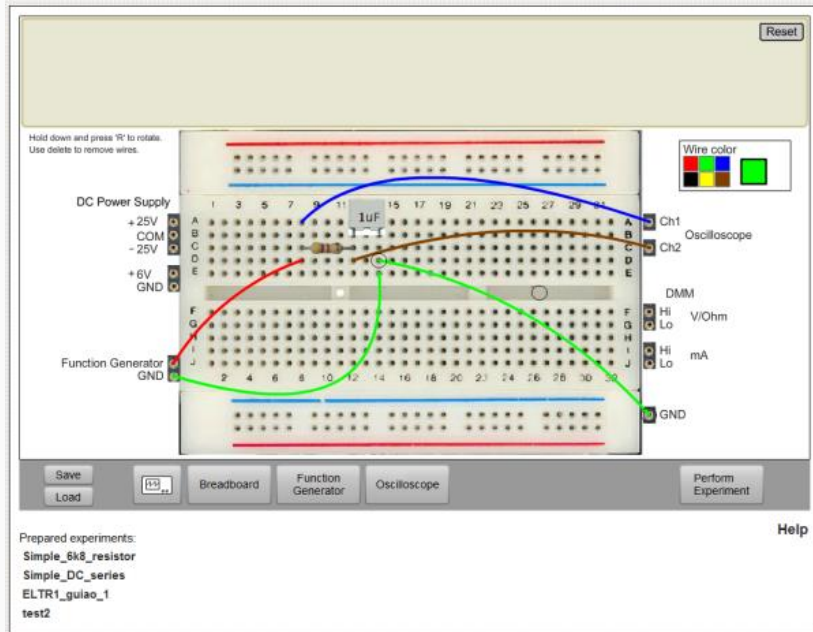
These rules must be defined according to the available hardware connections defined in the *ComponentList* file



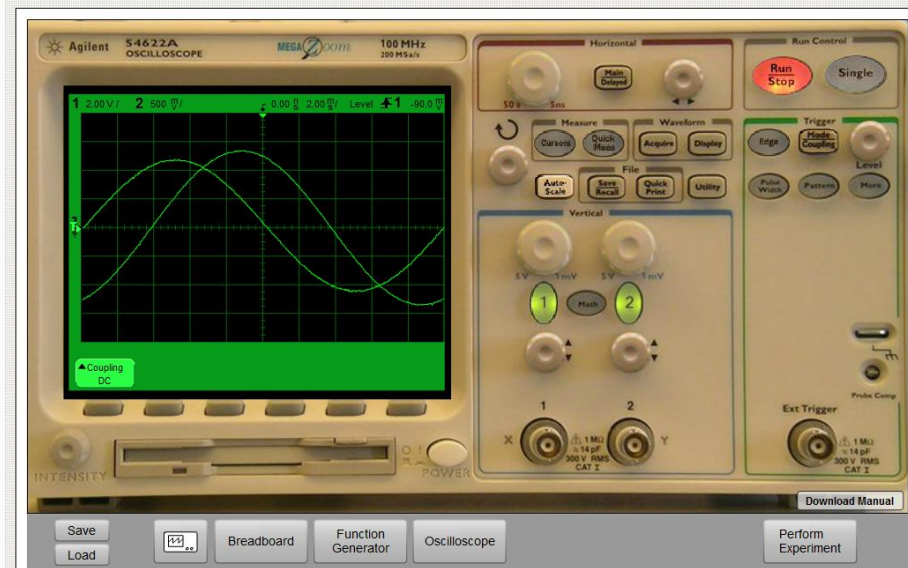
Pictures of the VISIR system installed at ISEP



Virtual breadboard and instrument selection using the VISIR



Instruments interfaces used during a remote experiment using VISIR



Course management

OpenLabs Electronics Laboratory

Logout

MAIN MENU
 +Start
 +About
 +Demo
 +FAQ

ADMIN
 +Wiki Pages
 +Admin courses
 +Users

TEACHER
 +ELTR1_2016

STUDENT
 +ELTR1_2016

Courses

Course name	Start	End	Max Users
Teste VISIR updated	2010-12-21	2010-12-28	100
FISIAP (LEI)	2010-09-24	2011-03-28	550
TCIRC (LEEC)	2011-02-20	2011-07-31	340
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Workshop 19Jan2011			
FEELE			
ELTR2 (LEEC)			
FISIC (LEM)			
FISIC (LEQ)			
CFISI (LEC)			
UFSC_Aranragua			
ELTRI (LEMECANA)			
SELEC			
INSA1 (LEIM)			
ELTRI (LEMECANA) 12_13			
fred01			
Collaboration_ALQuds			
Razwan_Test			
VISIR_WK_2015			
ELB-20302			
ELN-1202			
AMP-20303			
ELN-22105			
Test_course			

Collaboration_ALQuds

2013-03-06
2014-12-0
2015-01-0
2015-03-0
2015-03-0
2015-03-0
2015-03-0
2015-03-0
2015-05-3
2014-08-0
2016-03-0
2016-03-0
2014-02-0
2014-05-0
2016-02-0
2016-01-2
2016-03-2
2015-11-2
2010-01-0
2010-01-0
2010-07-1

Add course

OpenLabs Electronics Laboratory

Logout

MAIN MENU
 +Start
 +About
 +Demo
 +FAQ

ADMIN
 +Wiki Pages
 +Admin courses
 +Users

TEACHER
 +ELTR1_2016

STUDENT
 +ELTR1_2016

Edit course

Name: ELTR1_2016
 Start: 2016-03-09
 End: 2016-08-31
 Max Users: 310
 Max Seats: 10
 [Update] [Remove]

View as teacher

Responsible for course

E-Mail	User Type	Remove
ric@isep.ipp.pt	Teacher	Remove
ricardo.jgsn.costa@gmail.com	Instructor	Remove

E-Mail:
 User Type: [Teacher] [Instructor] [Add]

This VISIR laboratory is set up in collaboration with The School of Engineering at Blekinge Institute of Technology, in Sweden.

If you have any questions about this page or the laboratory, contact the administrator

This VISIR laboratory is set up in collaboration with Blekinge Institute of Technology, in Sweden.

E-Mail	User Type	Sessions	Activated	Enabled
1151419@isep.ipp.pt	Student	0	*	*
1151431@isep.ipp.pt	Student	0	*	*
1151432@isep.ipp.pt	Student	0	*	*
1151697@isep.ipp.pt	Student	0	*	*
1151769@isep.ipp.pt	Student	0	*	*
1151983@isep.ipp.pt	Student	0	*	*
197021@isep.ipp.pt	Student	0	*	*
rga@isep.ipp.pt	Student	0	*	*
md@isep.ipp.pt	Student	0	*	*

E-Mail:
 User Type: [Student] [Add]

If you have any questions about this page or the laboratory, contact the administrator

OpenLabs Electronics Laboratory

Logout

ELTR1_2016

Start: 2016-03-09
 End: 2016-08-31
 Max Users: 310
 Max Seats: 10
 LMS link Copy this

Prepared experiments

Name	Embed
Guiao_3	[X] Embed

Add prepared experiment

Reservations

Make teacher scheduled reservation

Users

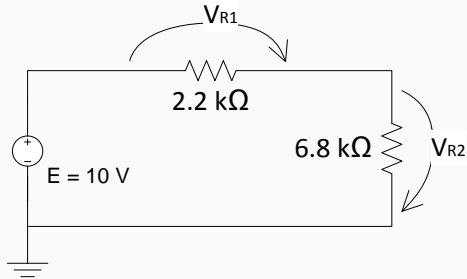
E-Mail	User Type	Sessions	Activated	Enabled
mrm@isep.ipp.pt	Student	0	*	*
gca@isep.ipp.pt	Student	1	*	*
aav@isep.ipp.pt	Student	0	*	*
rjc@isep.ipp.pt	Teacher	6	*	*
ricardo.jgsn.costa@gmail.com	Instructor	3	*	*
1091033@isep.ipp.pt	Student	0	*	*
1101479@isep.ipp.pt	Student	0	*	*
1071002@isep.ipp.pt	Student	0	*	*
1100425@isep.ipp.pt	Student	0	*	*
1090399@isep.ipp.pt	Student	0	*	*
1060865@isep.ipp.pt	Student	0	*	*
1050034@isep.ipp.pt	Student	0	*	*



Demo

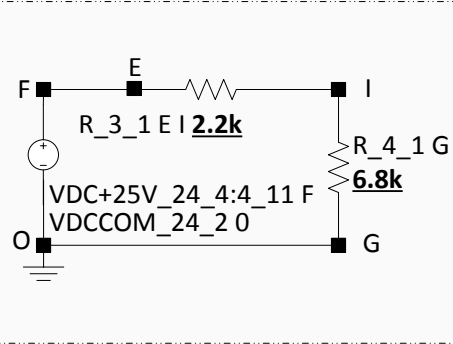
Web access: www.physicslabfram.isep.ipp.pt (Course: *TA_VISIR*; Name: *TA_demo1*)

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
```

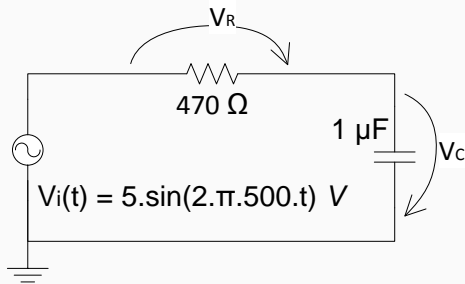


MaxList defined according to the following nodes using the available components connections specified in the *componentList* file.

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).

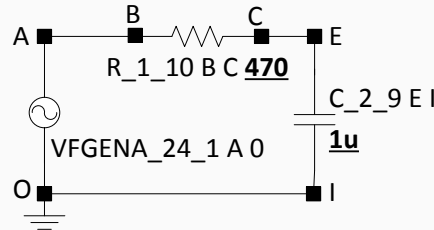
Web access: www.physicslabfram.isep.ipp.pt (Course: *TA_VISIR*; Name: *TA_demo2*)

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
```

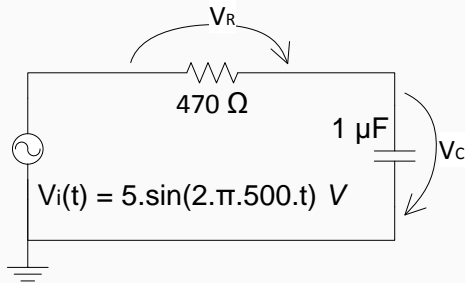


MaxList defined according to the following nodes using the available components connections specified in the *componentList* file.

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, $v_i(t)$, and the signal in the capacitor, $v_c(t)$ (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;

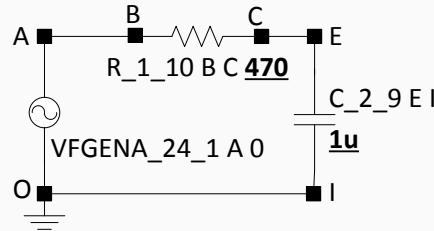
Web access: www.physicslabfram.isep.ipp.pt (Course: *TA_VISIR*; Name: *TA_demo2*)

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, $v_r(t)$, and in the capacitor $v_c(t)$;
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

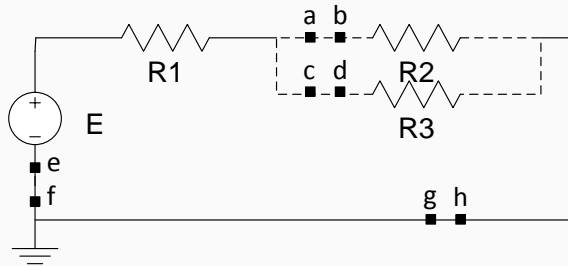
Pass: guestuser

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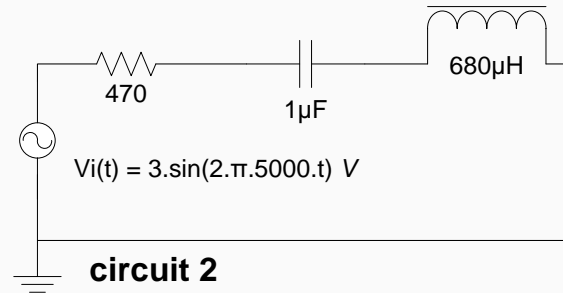
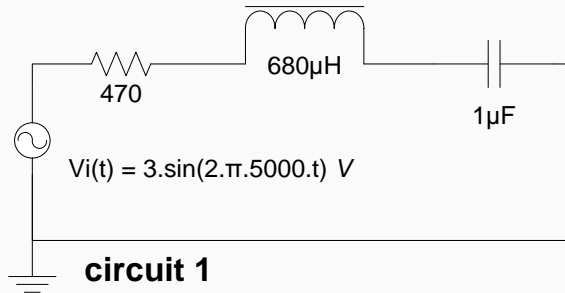
Web access: www.physicslabfram.isep.ipp.pt (Course: *TA_VISIR*; Name: *TA_circuit1*)



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

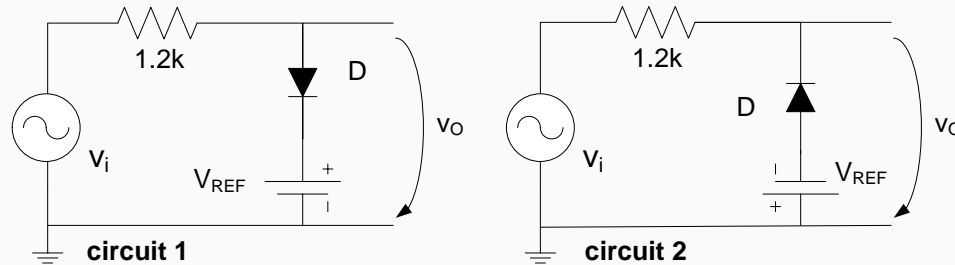
1. Setup one circuit in the breadboard according to the available resistors in the table;
2. Selecting the DC power, connect the outputs +6V and GND to the circuit;
3. Adjust the voltage source to $E=6$ V and confirm the value using the DMM;
4. Using the DMM measure the currents in the different branches 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.

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



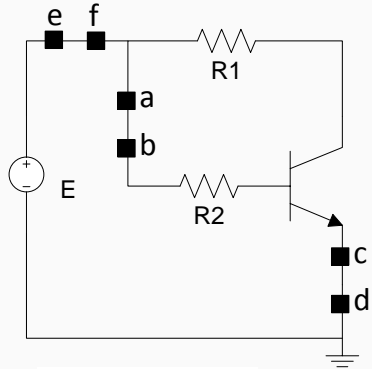
1. Setup circuit 1 and adjust $V_i(t)$ to the indicated values;
2. Using both channels of the oscilloscope confirm and visualize $V_i(t)$ and $V_c(t)$;
3. Using the DMM measure the RMS current in the different branches;
4. Using the DMM measure the RMS voltage in each component;
5. Setup circuit 2 and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

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

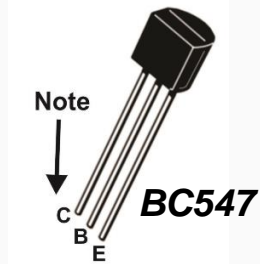


1. Setup circuit 1 and adjust the Function Generator to $V_i = 5 \cdot \sin(2 \cdot \pi \cdot 5000 \cdot t)$ V and confirm that value using the Oscilloscope;
2. Selecting the DC power, connect the outputs +25V and COM to the circuit (connect the COM to the GND), and adjust $V_{REF} = 2$ V. Confirm that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

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

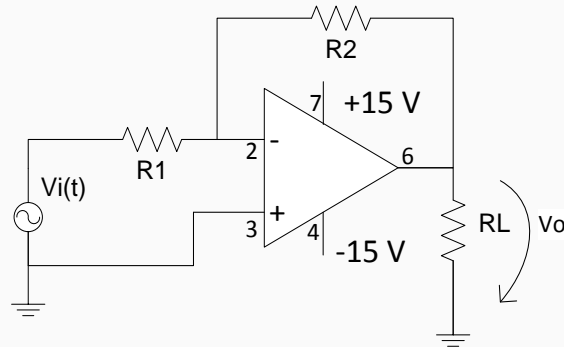


1. Setup the circuit, connect the DC power outputs +6V and COM (connect the COM to the GND), and adjust to $E=6\text{ V}$. Confirm that value using the DMM;
2. Using the DMM, fill-in the following table and evaluate the current state of the BJT (active, saturation or cut-off); (note: you can only measure 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							

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



$$R1 = 100 \text{ k}$$

$$R2 = 100 \text{ k or } 220 \text{ k}$$

$$R_L = 2.2 \text{ k}$$

$$E = 6 \cdot \sin(2 \cdot \pi \cdot 5000 \cdot t) \text{ V}$$

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 V_i voltage according to the indicated in the figure and, using the Oscilloscope, verify the amplitude and the frequency;
3. Using the Oscilloscope observe V_i and V_o of the circuit;
4. Using the DMM measure the RMS:
 - voltage in the different components;
 - current in the load.



Thank you for your attention!

