



The Challenges of Deploying and Using the VISIR Remote Laboratory

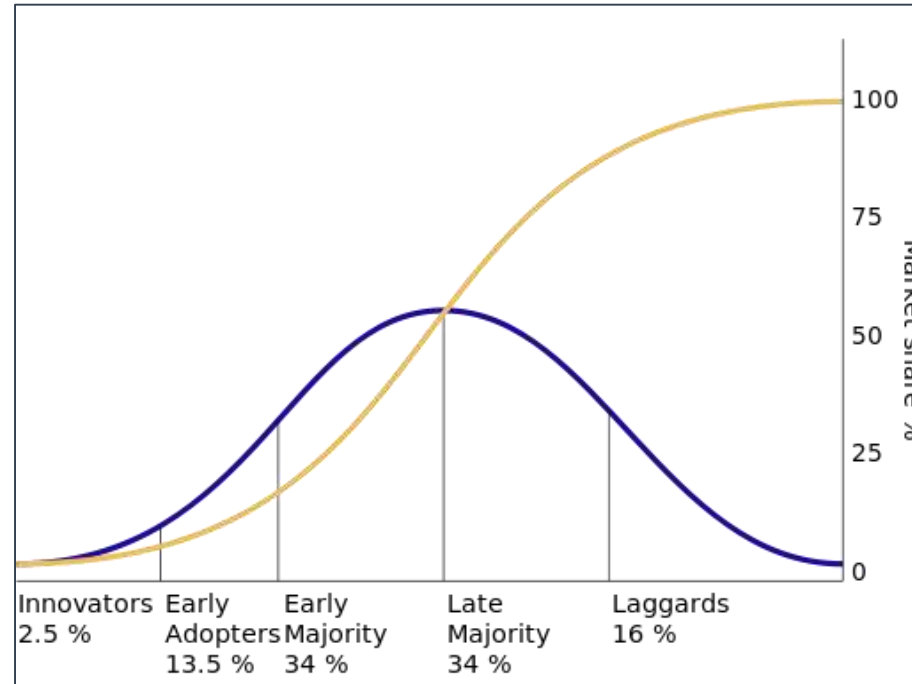
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Dec 05, 2019

BOGOTÁ

Innovation

EM Rogers in his book Diffusion of Innovation presented a curve with the percentages of types of adopters of innovations:



Rogers' Curve for the diffusion of innovation available in Public Domain at https://commons.wikimedia.org/wiki/File:Diffusion_of_ideas.svg

Why Start with Innovation?

Because deploying and using VISIR was an innovation in learning and teaching engineering at PUC-Rio.

And What Does VISIR Mean?

Virtual Instrument **S**ystems in **R**eality.

And What Is VISIR?

VISIR is Remote Lab – this means that is a Real Resource with Remote Access.

According to Heradio et al., there exist the following possibilities: (1) Real Resource with Remote Access; (2) Real Resource with Local Access; (3) Virtual Resource with Remote Access; and (4) Virtual Resource with Local Access.

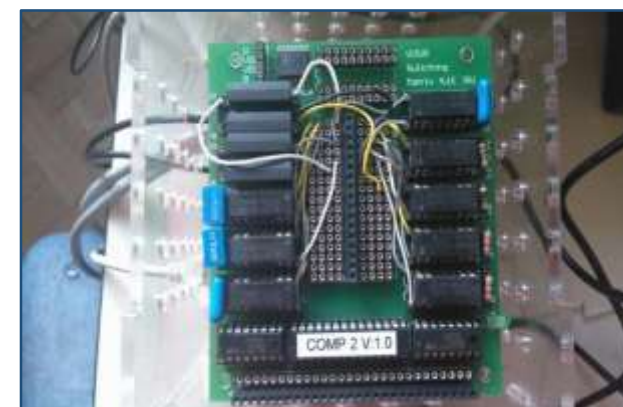
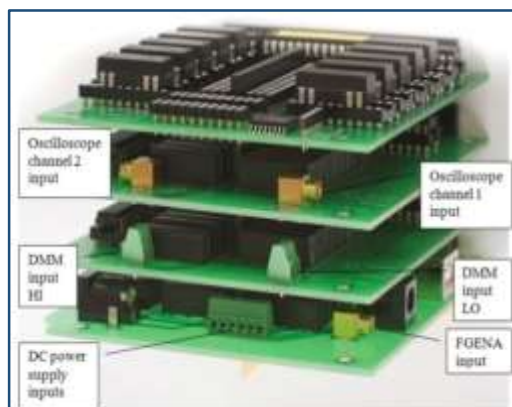


How Did We Get VISIR?

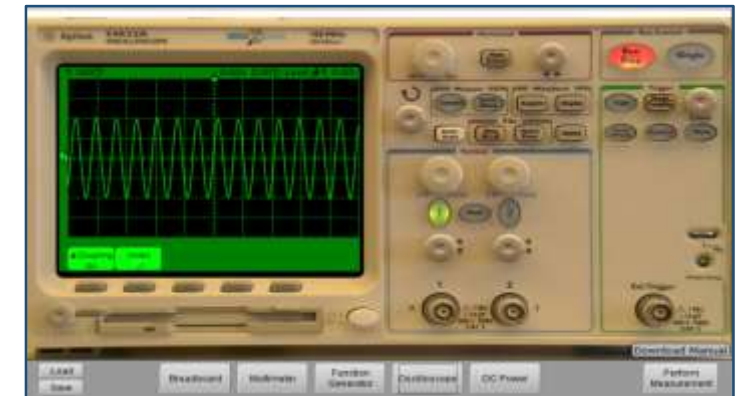
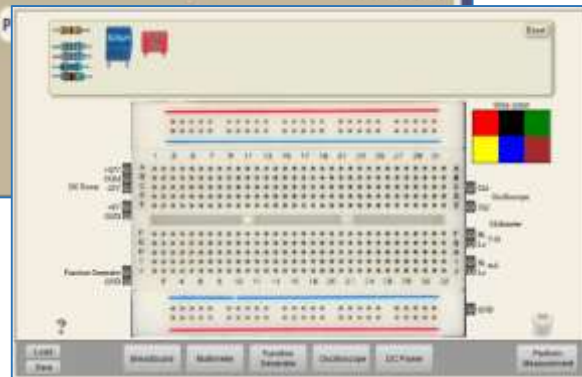
VISIR came to PUC-Rio through the VISIR+ Project partially funded by the European Commission (grant 561735-EPP-1-2015-1-PT-EPPKA2-CBHE-JP).

The participants in the project were one Swedish university (where VISIR was developed), one Austrian university, two Spanish universities, one Portuguese university (leader of the project), three Brazilian universities and two Argentinian universities.

Real Resource



Remote Access



Who Were the Team Members of This Project?

The group of faculty members (innovators in Rogers' curve) who have been working with Information and Communication Technology supported learning in engineering.

What Had Been Done Before VISIR?

- There is a long timeline that goes back to 1995.
- The highlights in this time line are:
 - The development of the Maxwell System (www.maxwell.vrac.puc-rio.br) that is the integration of an LMS – Learning Management System, an IR – Institutional Repository and, after VISIR, a service broker for Remote Labs. Users can “walk” from one environment to the other with seamless transitions.
 - The integration of SciLab (www.scilab.org) into the platform to allow simulations to be performed “wrapped” in hypermedia learning objects.
 - The development of over 500 OER – Open Educational Resources easily available from an aggregator.
 - The development of an aggregator to all contents related to Electrical and Control & Automation Engineering – besides OER, there are ETD – Electronic Theses & Dissertations, Senior Projects, articles, external links to sites/repositories of interest etc.

What Had Been Done Before VISIR? (cont'd)

- The highlights in this time line are:
 - The offer of undergraduate and graduate courses in the blended learning (b-learning) mode.
 - The implementation of a Research Data collection.

What Has Been Done After VISIR?

- Development of a collection of podcasts.
- Development of apps (one published so far and two – using Augmented Reality on their way).
- Offer of more b-learning courses.
- Offer of one distance learning course (e-learning) starting next March.

Some Screen Shots...

Open Educational Resources

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WELCOME TO OPEN EDUCATIONAL RESOURCES @PUC-Rio

The Open Educational Resources @PUC-Rio project has the objective of sharing learning materials developed by a team of faculty, graduate students, undergraduate students and technical staff.

Educational resources were the reason to create the Sistema Maxwell whose first mission was to be a digital library of courseware in Electrical Engineering. The first learning resource was developed in the second semester of 1995 despite the limited ICT - information and Communication Technology tools available.

From 1995 on, many authors have contributed with their knowledge and their skills to make a reasonable size collection available. The main focus of the development is Engineering, specially Control & Automaton and Electrical. Related topics are also a part of the collection.

The collection is under constant growth due to the need to supply courseware both to support traditional face-to-face courses and to provide courseware for students in the blended learning (b-learning) mode courses.

An important characteristic of the collection building is the fact tha students (undergraduate and graduate) are active creators and developers of the items. They also suggest topics that they feel necessary.

Use and enjoy our ever growing collection!

All contents in this interface are available through Creative Commons License Attribution-Noncommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0)

WELCOMING USING THE NYQUIST CRITERION AND THE FREQUENCY RESPONSE

How does the system behave? Under which conditions is it stable?

One possibility to understand the behavior is the analysis of the velocity that can be obtained using transfer function $F(s)$. The plot of the step response shows the dynamic velocity varies when a step is applied and if it stabilizes after some time.

Enter the proper parameter values to determine the new models.

$$F_1 = (s^2 + 2s + 1) / (s^2 + 4s + 4) \quad F_2 = (s^2 + 1) / (s^2 + 4s + 4)$$

$$F_3 = F_1 \cdot F_2 = (s^2 + 2s + 1) / (s^2 + 4s + 4)$$

The step response is:

Input signal: $f(t) = 1$ for $0 < t < 1$, $f(t) = 0$ otherwise.

Output signal: $f_1(t) = 1$ for $0 < t < 1$, $f_1(t) = 0$ otherwise.

Block diagram: $U(s) \rightarrow \text{Controlador } C(s) \rightarrow \text{Processo } P(s) \rightarrow Y(s)$ with a feedback loop from $Y(s)$ to $U(s)$.

Transfer function: $H(s) = \frac{Y(s)}{U(s)} = \frac{C(s)P(s)}{1 + C(s)P(s)}$

ELÉTRICA ON-LINE

Controlador PID

Resposta ao degrau unitário com o controlador (G(s))

$$G(s) = K_p \left(1 + \frac{1}{T_i s} + T_d s \right)$$

Parameters: $K_p = 2$, $T_i = 6$, $T_d = 0$

What Were the Challenges in the Title?

- Master the use of the equipment – there was a good help from the European universities.
- Integrate VISIR to the Maxwell System in order to provide a seamless migration between environments and use all infrastructure the platform offers in terms of users and contents management.
- Identify courses that could be potential users of VISIR.
- Identify instructors to be potential users (early adopters in Rogers' curve) of the equipment – additional work was necessary.
- Define and create all contents, both technical and educational, that were necessary to support the use by students. The contents can be found in Open Access at Resources (www.maxwell.vrac.puc-rio.br/projetosEspeciais/VISIR/resources.html) of the small VISIR+ websire (www.maxwell.vrac.puc-rio.br/projetosEspeciais/VISIR/index.html).
- Run VISIR in three courses (Introduction to Engineering – Electric Engineering, Electric & Electronic Circuits and General Electricity) and analyze results.
- Implement the necessary fixes.

What Were the Results?

- Stop the use in Introduction to Engineering – the instructors and the TAs left the course and the other team did not belong to the “early adopters” group.
- Change the use in Electrical & Electronic Circuits – the additional work for students was too big. Each experiment had three steps – theoretical analysis, simulation using CircuitLab (www.circuitlab.com) and performing it in the traditional lab. The fourth step became the use of VISIR between simulation and workbench. The decision was to keep VISIR in some experiments that do not have the workbench activity anymore.
- Maintain the same use in General Electricity – a real case of success. The over 100 students each term who could perform 8 experiments now perform 12.
- Implement two new remote labs (artifacts created at PUC-Rio) for Control Systems.

More Screen Shots...

VISIR
Remote Lab & International Cooperation

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

Roteiro para a Atividade Complementar: Laboratórios em Engenharia Elétrica

Autor: Delberis Araujo Lima
Colaborador: Felipe Calliari

[ENTRAR]

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Atividade Complementar - VISIR

Conceitos Básicos de Refinicações

Vídeo

Refinificador de Tensão

DEEE DEPARTAMENTO DE ENGENHARIA ELÉTRICA

SIMULAÇÕES EM ENGENHARIA ELÉTRICA

DIVISOR DE CORRENTE

Camilla Schiavo

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[ENTRAR]

DEEE DEPARTAMENTO DE ENGENHARIA ELÉTRICA

SIMULAÇÕES EM ENGENHARIA ELÉTRICA

DIVISOR DE CORRENTE

SIMULADOR

O valor das correntes é dado por: $i_n = \frac{V}{R_n}$

ONDE:
 $n = 1, 2, 3, \dots, N$
 V é a tensão da fonte

A potência dissipada em cada resistor: $P_n = (V) i_n$

A corrente no circuito é dada por: $i = \frac{V}{R_{eq}}$

R_{eq} é a resistência equivalente

Se você não se lembra como calcular a resistência equivalente use o simulador de Associação de Resistores Elétricos Lineares

VISIR
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Atividade Complementar - VISIR

Conceitos Básicos sobre Tensão e Corrente Elétrica

Vídeo

Tensão elétrica

William de Souza Barbosa
PUC-Rio
Outubro 2019

VISIR
Remote Lab & International Cooperation

Manual Técnico de Utilização do VISIR

William de Souza Barbosa
PUC-Rio
Outubro 2019

DEEE DEPARTAMENTO DE ENGENHARIA ELÉTRICA

SIMULAÇÕES EM ENGENHARIA ELÉTRICA

DIVISOR DE CORRENTE

INTRODUÇÃO

O divisor de corrente é muito útil quando se deseja obter um valor de corrente que seja uma fração de um valor se disponível, sendo muito importante também para o estudo de circuitos elétricos e eletrônicos.

Neste simulador, pode-se calcular o resultado de um divisor de corrente com um único resistor.

As simulações do divisor de corrente são feitas on-line e em tempo real utilizando o Scilab (<http://www.scilab.org/>). O Scilab integra-se com o Manual para poder executar as suas funções a partir deste sistema através do Internet.

O Scilab é o Scilab? Veja a resposta na sua página <http://www.scilab.org/pt-br/ABOUT>.

What is Scilab?

Scilab is free and open source software for numerical computation providing a powerful computing environment for engineering and scientific applications. Scilab is released as open source under the GNU GPL license (GPL-compatible), and is available for download free of charge. Scilab is available under CREMATICA, Mac OS X and Windows XP/Vista/7/8 (see system requirements).

A potência total no circuito: $P = (V) i$

Considerando $n = 5$, entre com o valor da fonte de corrente e o valores das resistências para calcular o divisor de tensão. Você não deve digitar valores em branco.

$V = 48 \quad R_1 = 30 \quad R_2 = 20 \quad R_3 = 30 \quad R_4 = 40 \quad R_5 = 10$

$R_5 = 30 \quad 0$

[Simular]

Resistência (Ohms)	Corrente (Ampere)	Potência (Watt)
30.00	0.02	4.13
20.00	0.17	6.59
30.00	0.28	12.57
40.00	0.35	16.79
10.00	0.44	20.99

2 resistores em paralelo 4.00 Ω

A potência dissipada no resistor é 10.00 W

Visit Our Small VISIR Website



The screenshot shows the home page of the VISIR website. At the top left, the logo "VISIR" is displayed in a large, blue, sans-serif font, with the tagline "Remote Lab & International Cooperation" underneath. To the right of the logo is a small European Union flag and the text "Co-funded by the Erasmus+ Programme of the European Union". Below the logo, a dark blue navigation menu is visible on the left side, with "HOME" highlighted in white. The main content area has a dark blue background with a pattern of yellow stars. It features a central welcome message: "Welcome to the VISIR Project website!". Below this message is a large, colorful logo for "VISIR+" where the letters are in various colors (V: red, I: blue, S: green, I: red, R: blue) and the "+" is green, all set against a blue square with yellow stars. At the bottom of the page, there is a paragraph of text explaining that VISIR is a Remote Laboratory System for Electric and Electronic Circuits, and another paragraph stating the website's objective to inform about the project, activities, and results.

VISIR
Remote Lab & International Cooperation

Co-funded by the
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of the European Union

HOME

HOME

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Welcome to the VISIR Project website!

VISIR+

VISIR is the name of a Remote Laboratory System for Electric and Electronic Circuits. It is also the short name used to identify the project [Educational Modules for Electric and Electronics Circuit Theory and Practice Following an Enquiry-based Learning and Teaching Methodology Supported by VISIR](#).

This website has the objective of informing about the project, the activities and the results.

www.maxwell.vrac.puc-rio.br/projetosEspeciais/VISIR/index.html

Aknowledgements

The VISIR team at PUC-Rio is very grateful to the VISIR team at CUAS – Carinthia University of Applied Science for its goodwilled lending of the equipment and competent support in the process of installation.

The VISIR+Project was funded by the European Commission through grant 561735-EPP-1-2015-1-PT-EPPKA2-CBHE-JP. The PUC-Rio team is grateful for this opportunity of having VISIR and being part of such important project.