Laboratórios remotos: Um Experimento Internacional de Educação em Engenharia

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

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DE EDUCAÇÃO EM ENGENHARIA
"20 Anos de REENGE
Caminhos da Engenharia"

Fundamentos

- Five Major Shifts in 100 Years of Engineering Education
  - Froyd, Wankat, and Smith (2012)
- The Role of the Laboratory in Undergraduate Engineering Education
  - Feisel and Rosa (2005)
- Remote Experimentation Network - Yielding an Inter-University Peer-to-Peer e-Service
  - Alves et al. (2005)
- Virtual Instrument Systems in Reality (VISIR)
  - Gustavsson et al. (2006)

Five Major Shifts in 100 Years of EE

1. a shift from hands-on and practical emphasis to engineering science and analytical emphasis
2. a shift to outcomes-based education and accreditation
3. a shift to emphasizing engineering design
4. a shift to applying education, learning, and social-behavioral sciences research
5. a shift to integrating information, computational, and communications technology in education

Five Major Shifts in 100 Years of EE

4. a shift to applying education, learning, and social-behavioral sciences research
   - Educational Objectives, Mastery, and Student Learning Outcomes
   - Student Engagement
   - **Inquiry**
   - Integrated Approach to Course and Program Design
   - Importance of a Broader Range of Knowledge, Skills, and Attributes
   - Scholarly Approach to Engineering Education through the Scholarship of Teaching and Learning (SoTL) and Engineering Education Research

Five Major Shifts in 100 Years of EE

5. a shift to integrating ICT in education
   - content delivery: television, videotape, and the Internet
   - programmed instruction: individualized student feedback
   - personal response systems (clickers)
   - computational technologies
   - intelligent tutors: second phase of individualized student feedback
   - **simulations**
   - games and competitions
   - **remote laboratories**
   - grading

The Role of the Laboratory in Undergraduate EE

- The Fundamental Objectives of Engineering Instructional Laboratories

- Objective 1: Instrumentation
- Objective 2: Models
- Objective 3: Experiment
- Objective 4: Data Analysis
- Objective 5: Design
- Objective 6: Learn from Failure
- Objective 7: Creativity
- Objective 8: Psychomotor
- Objective 9: Safety
- Objective 10: Communication
- Objective 11: Teamwork
- Objective 12: Ethics in the Lab
- Objective 13: Sensory Awareness

Questões

- Qual o aporte de cada tipo de laboratório (real, virtual, remoto) na prossecução de cada um desses objetivos?

- Qual o impacto do estilo de aprendizado de cada aluno e aluna na seleção da melhor estratégia didática de utilização desses tipos de laboratório?

- Como usar esses recursos (laboratórios) para endereçar a aprendizagem individual, i.e. um dos 14 grandes desafios da Engenharia para o séc. XXI?

The ALFA-II-465-A RexNet-yippee project

... see 1st slide

- Proposal
  - submitted October 2003 – accepted July 2004
- Project
  - Start: January 2005
  - Duration: 24 months
  - Consortium:10 Institutions of Higher Education (IHE)
    - 5 European (3 countries) and 5 Latin American (3 countries)
  - Total budget: € 174.015,00 (EC contribution: € 129.695,00)

www.rexlab.net

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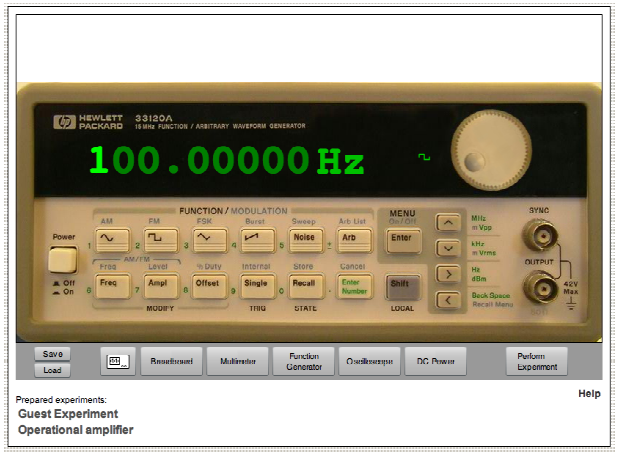
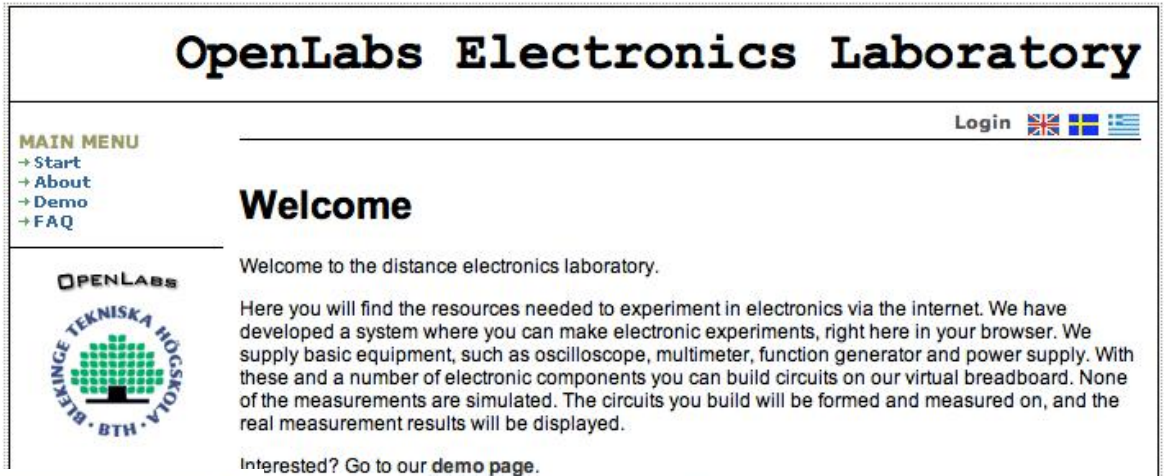
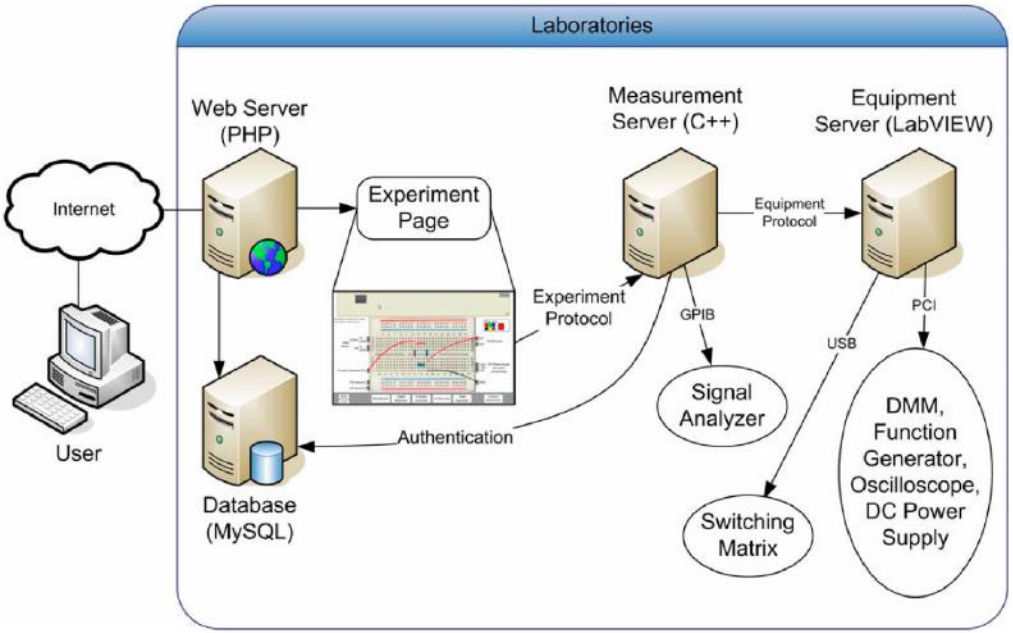
Virtual Instrument Systems in Reality (VISIR)







The measurement hardware

ou have any questions about this page or the laboratory, contact the **administrator**.

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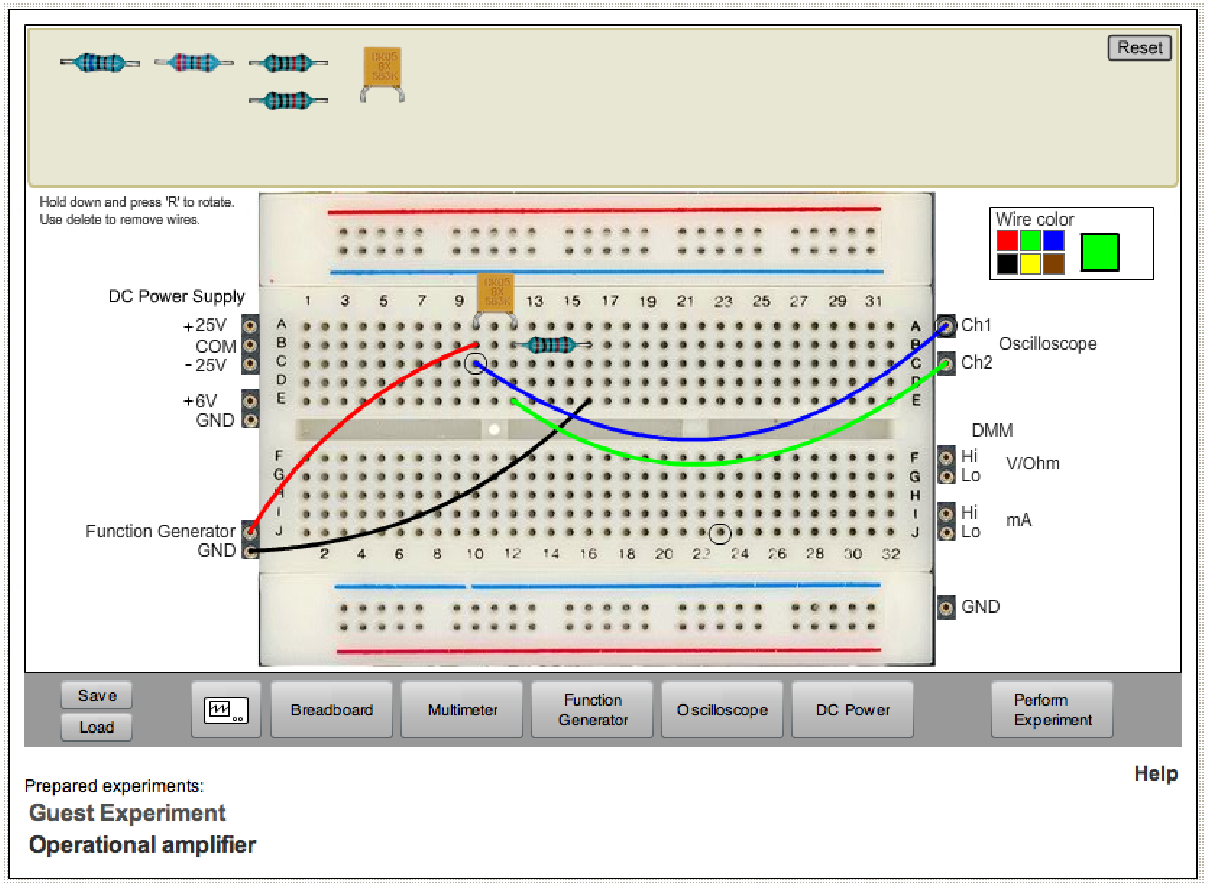
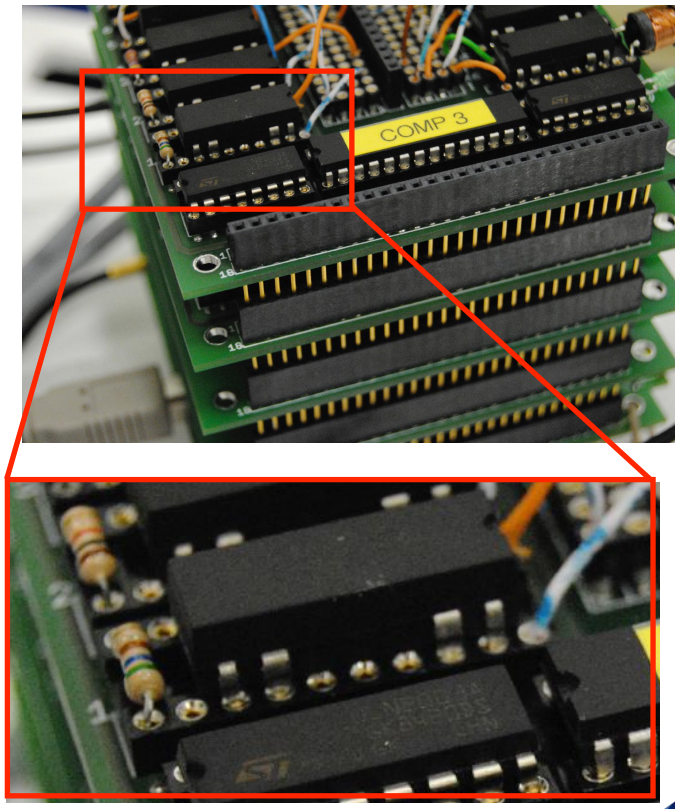
Virtual Instrument Systems in Reality (VISIR)





VISIR Laboratories

- University of Deusto, Spain
- FH Campus Wien University of Applied Sciences, Austria
- Blekinge Institute of Technology, Sweden
- Carinthia University of Applied Sciences (CUAS), Austria
- School of Engineering – Polytechnic of Porto, Portugal
- National University for Distance Education, Spain
- Indian Institute of Technology Madras, India
- Batumi Shota Rustaveli State University, Georgia

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The GOLC award 2015

Global Online Laboratory Consortium

GOLC
2015 Online Lab Award

The GOLC Online Laboratory Award 2015 in the category

„Remote Controlled Lab"

is presented to

VISIR (Virtual Instrument Systems in Reality)

Submitted by:

Ingvar Gustavsson, Gustavo Alves, Thomas Fischer, Javier Garcia Zubia, Felix Garcia, Manuel Castro

Awarded during the 12th International Conference on Remote Engineering and Virtual Instrumentation (REV2015) in Bangkok, Thailand

Abul K. M. Azad
President

Michael E. Auer
Secretary General

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Do Erasmus+ ...

- **Erasmus+** is the EU Programme in the fields of education, training, youth and sport for the period 2014-2020.
  - KEY ACTION 2: Cooperation for Innovation and the Exchange of Good Practices
    - Capacity Building in the field of higher education
- Com base nos fundamentos apresentados, submeteu-se uma proposta de projeto ao programa Erasmus+
  - Educational Modules for Electric and Electronic Circuits Theory and Practice following an Enquiry-based Teaching and Learning Methodology supported by VISIR

... ao VISIR+

Módulos Educacionais para a teoria e prática sobre circuitos elétricos e eletrônicos baseados em uma metodologia de ensino e de aprendizagem por indagação, assistidos pelo VISIR

- O título sintetiza todo o racional e enfoque do projeto
  - Módulos educativos
  - Teoria e prática sobre circuitos elétricos e eletrônicos
  - Metodologia de ensino e de aprendizagem por indagação
  - Laboratório remoto: VISIR

Educational Modules for Electric and Electronic Circuits Theory and Practice following an Enquiry-based Teaching and Learning Methodology supported by VISIR

Kick-Off Meeting (KOM), Karlskrona, Sweden, 1-3 February 2016

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

Project Consortium

Project Consortium


uarez Bento da Silva
rofessor Idealizador do Projeto

Work Packages [**name**]

WP1 [**Preparation**]

- 1st training action
- Installing VISIR in all LA HEIs, plus local workshops for training technical staff in VISIR configuration issues.

WP2 [**Development**]

- 2nd and 3rd training actions
- The educational modules development
- 1st midterm checkpoint (TAEE'16)

WP3 [**Quality monitoring**]

- Data collection and analysis of learning gains
- 2nd midterm checkpoint (EDUCON'17)

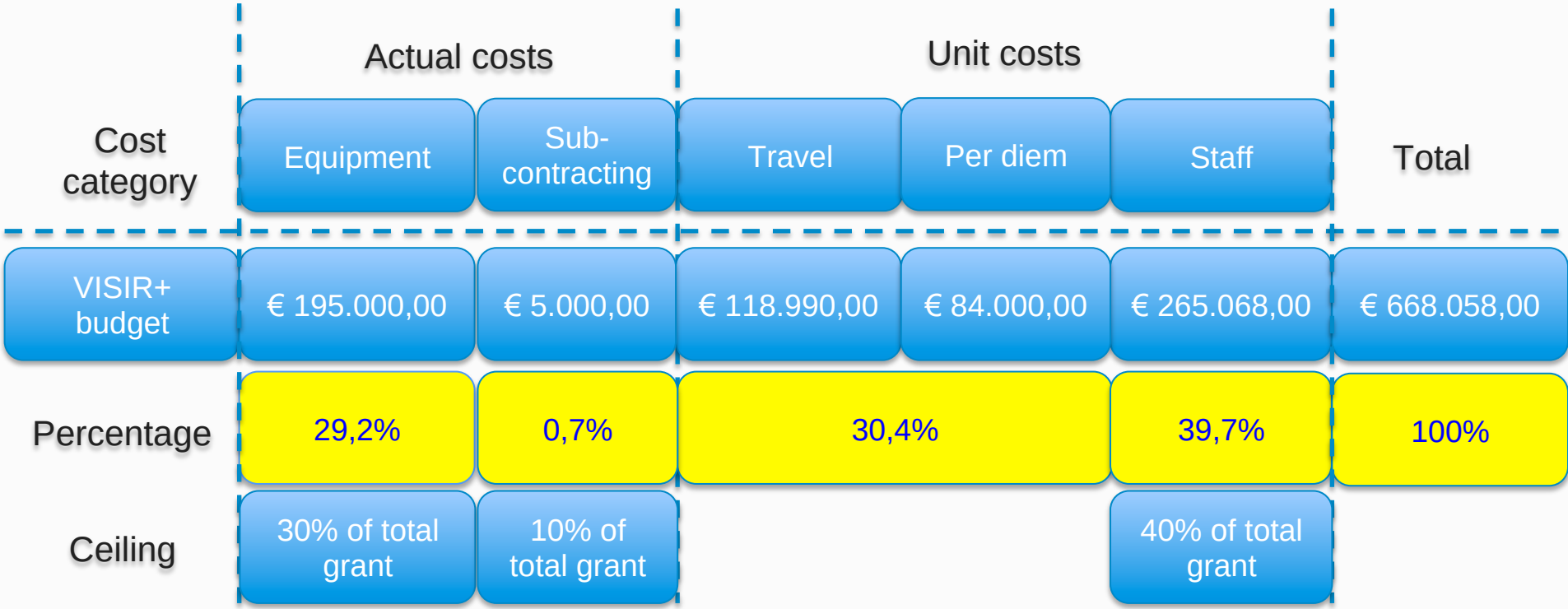
WP4 [**Dissemination**]

- Local and regional dissemination & exploitation

WP5 [**Management**]

- KOM
- Pool of missions allocated to the project coordinator
- Final project meeting

Budget (per cost category)



Project outcomes

Work Package 1

- Number of local and remote participants in TA1 + satisfaction questionnaires
- Number of local participants in technical workshops run by BTH elements, at each one of the LA HEIs +
- URL of each installed system

Work package 2

- Number of local and remote participants in TA2 and TA3 + satisfaction questionnaires
- Enriched course curricula, lessons plans, contents of the courses LMS pages

Work Package 3

- Results of each pedagogical implementation using VISIR
- To be discussed in detail tomorrow!

Work package 4

- Number of aggregated institutions (associated partners is a 1st step towards)
- Number of news appearing on media, number of scientific publications, seminars, etc.
- Also to be discussed in detail tomorrow!

Associated partners

Ref.	Name of organisation	Type of institution	City	Country	Associated with
A1	Instituto Federal Catarinense - IFC	Secondary and Tertiary Education	Blumenau	Brazil	IFSC
A2	Universidade Do Estado de Santa Catarina - UDESC	Higher Education	Joinville	Brazil	IFSC
A3	Instituto Federal Catarinense - Campus Sombrio	Secondary and Tertiary Education	Campo Sombrio	Brazil	UFSC
A4	SATC - Associação Beneficente da Indústria Carbonífera de Santa Catarina	Professional, Primary, Secondary and Tertiary Education	Criciuma	Brazil	UFSC
A5	Universidade do Estado do Rio de Janeiro - UERJ	Higher Education	Rio de Janeiro	Brazil	PUC-Rio
A6	Centro Federal de Educação Tecnológica Celso Suckow da Fonseca (CEFET-RJ)	Professional Education	Rio de Janeiro	Brazil	PUC-Rio
A7	Instituto Politécnico Superior “Gral. San Martín” (IPS)	Secondary and Tertiary Education	Rosario	Argentina	UNR
A8	Facultad Regional Rosario – Universidad Tecnológica Nacional (UTN FRRO)	Higher Education	Rosario	Argentina	UNR
A9	Escuela Técnica Nº 8	Secondary Education	Santiago del Estero	Argentina	UNSE
A10	Universidad Católica de Santiago del Estero	Higher Education (Private)	Santiago del Estero	Argentina	UNSE

… e ao PILAR

- Uma segunda proposta dedicada à criação de uma federação de laboratórios remotos VISIR tem vindo a ser desenvolvida desde 2014.
- Submetida em 2014, 2015, e 2016, foi recentemente selecionada (Julho) pela Agência Espanhola do programa Erasmus+
- Esta primeira rede federada de laboratórios remotos visa o seguinte mote:

Uma experiência para todos os alunos

Todas as experiências para um aluno

Sweden

...

Spain

Brazil

Portugal

Creating a VISIR grid

Practical limit

Theoretical limit

How many experiments?

Theoretical limit

Replicating the VISIR system with a different matrix layout and components

Improving the HW & SW may push the current limit (technology-dependent)

Creating a VISIR grid

Number of remote experiments available simultaneously

Practical limit

Number of users accessing the remote laboratory simultaneously

How many users?

Replicating the VISIR system with the same matrix layout and components

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Obrigado pela atenção

Dúvidas e questões?

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SD - Sessão Dirigida 01

LABORATÓRIOS REMOTOS NO ENSINO DE ENGENHARIA

Coordenador: Gustavo Ribeiro Alves – IPP/ISEP – Porto/PT

Relator: Juarez Bento da Silva – UFSC

Dia 28 Setembro – quarta-feira – 14:30 - 17:30

Auditório: Pitomba