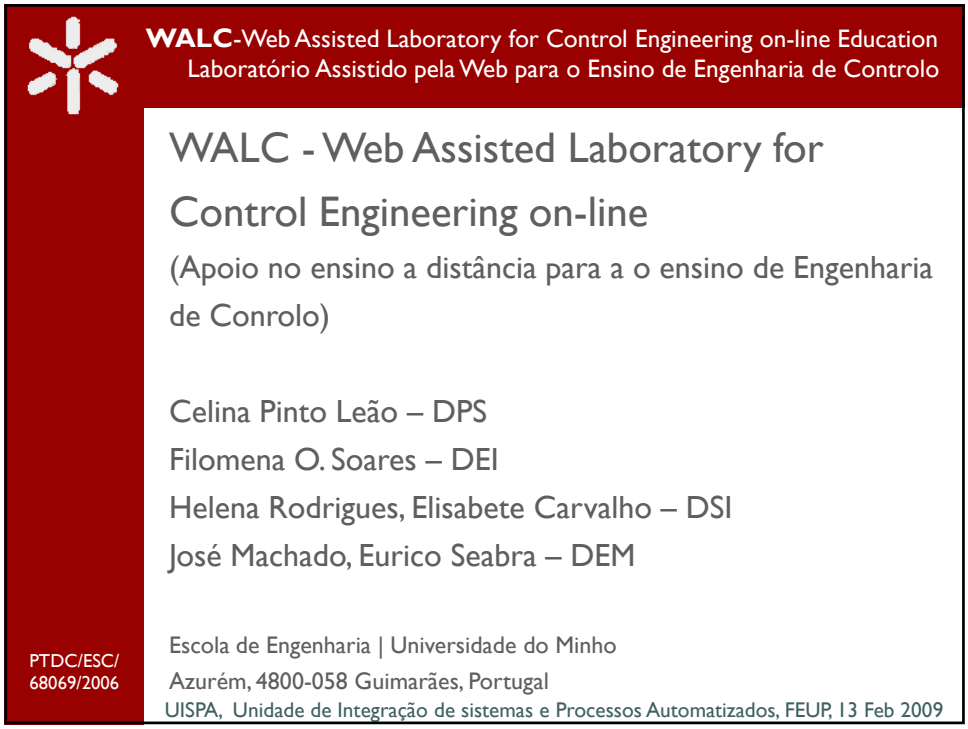
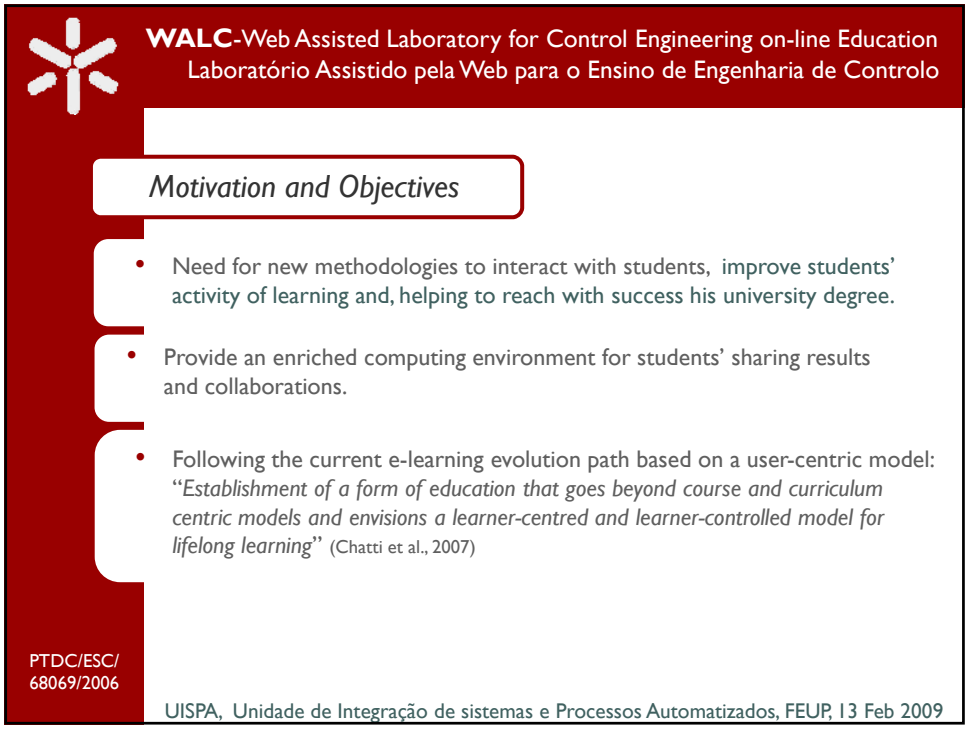
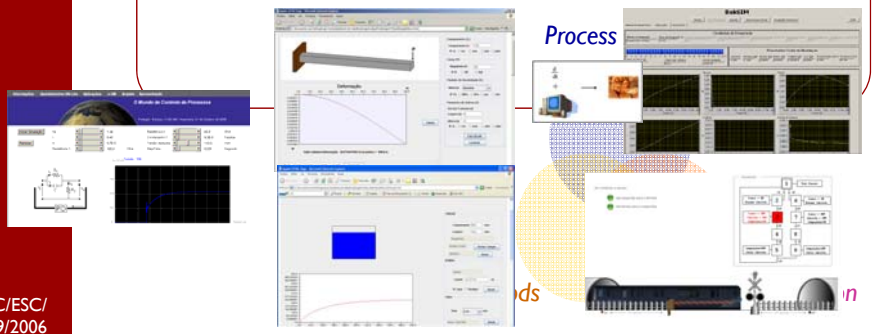




WALC-Web Assisted Laboratory for Control Engineering on-line Education
Laboratório Assistido pela Web para o Ensino de Engenharia de Controlo

Brief history

1. In the past: different web-aided applications for undergraduate students: numerical methods and process control (Leão & Soares, 2006)



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Virtual Laboratory – SimLab

Main web page for Control Simulator

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Virtual Laboratory – SimLab

- Virtual simulation of different real world systems:
  - Electrical
  - Hydraulic
  - Thermal
  - Mechanical
  - …
- Open or close loop modes
- On-line change of process and control parameters
- Several numerical methods to solve the defined systems of ODEs
- Theoretical support

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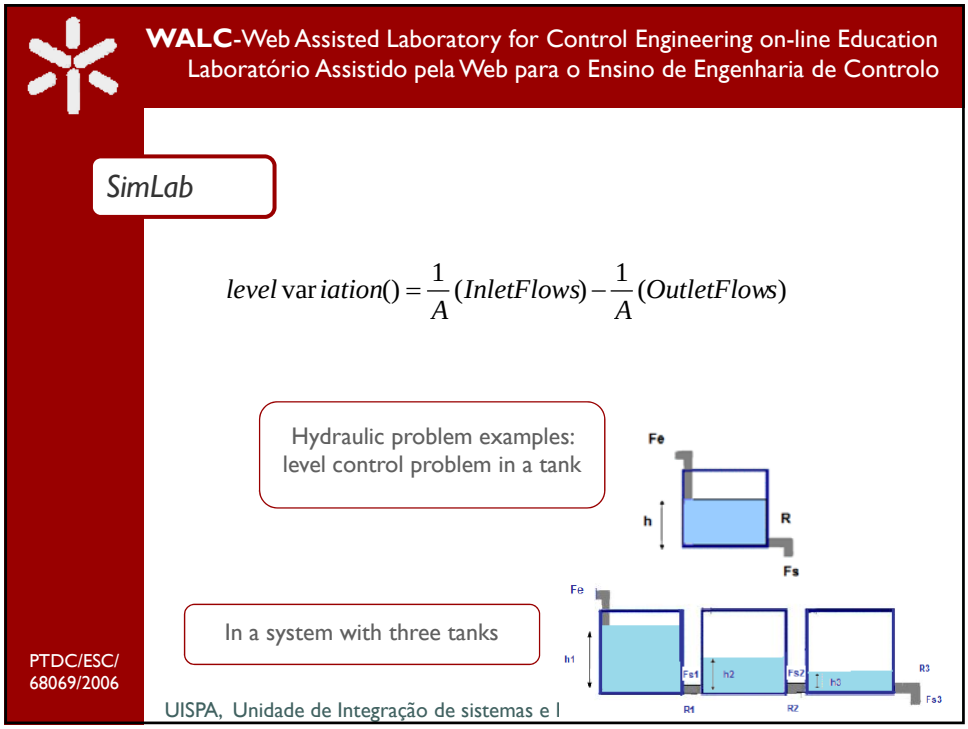
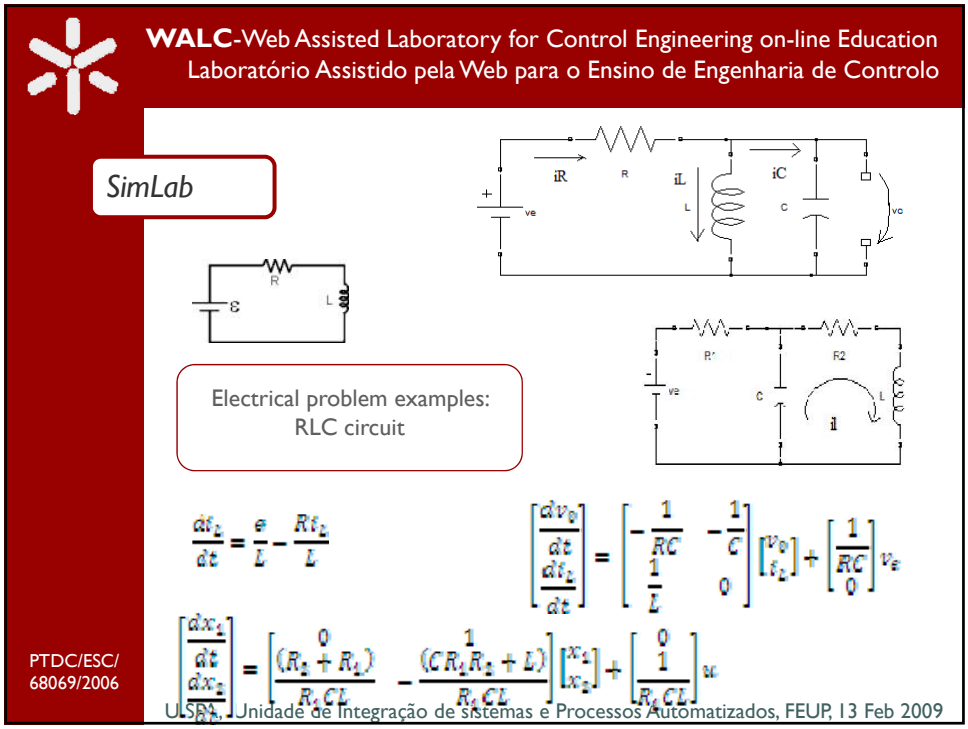
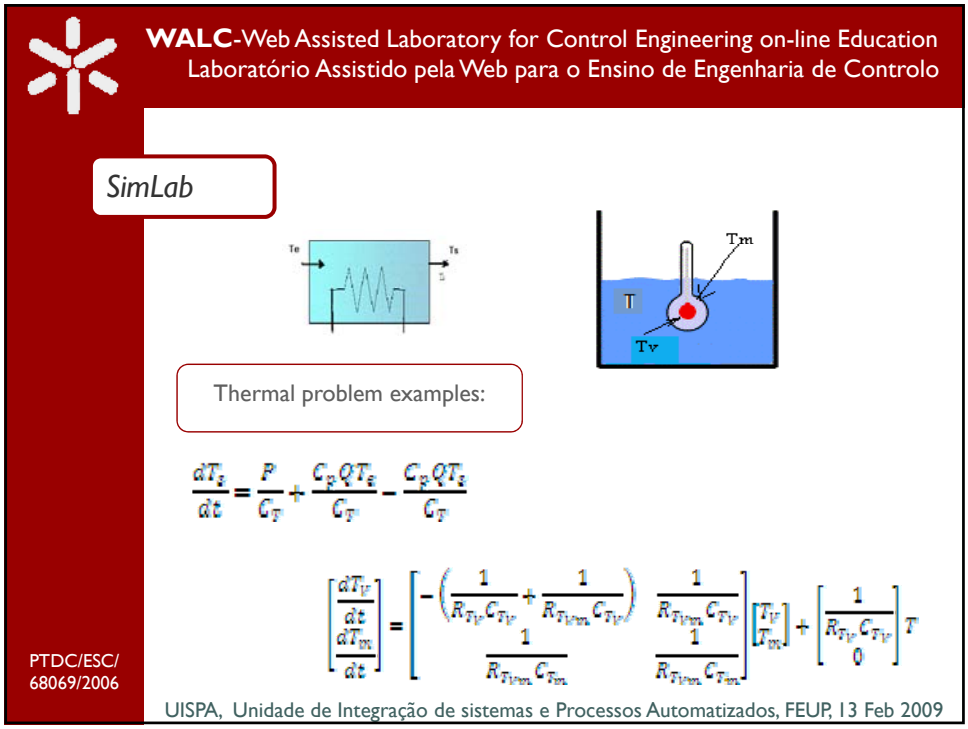
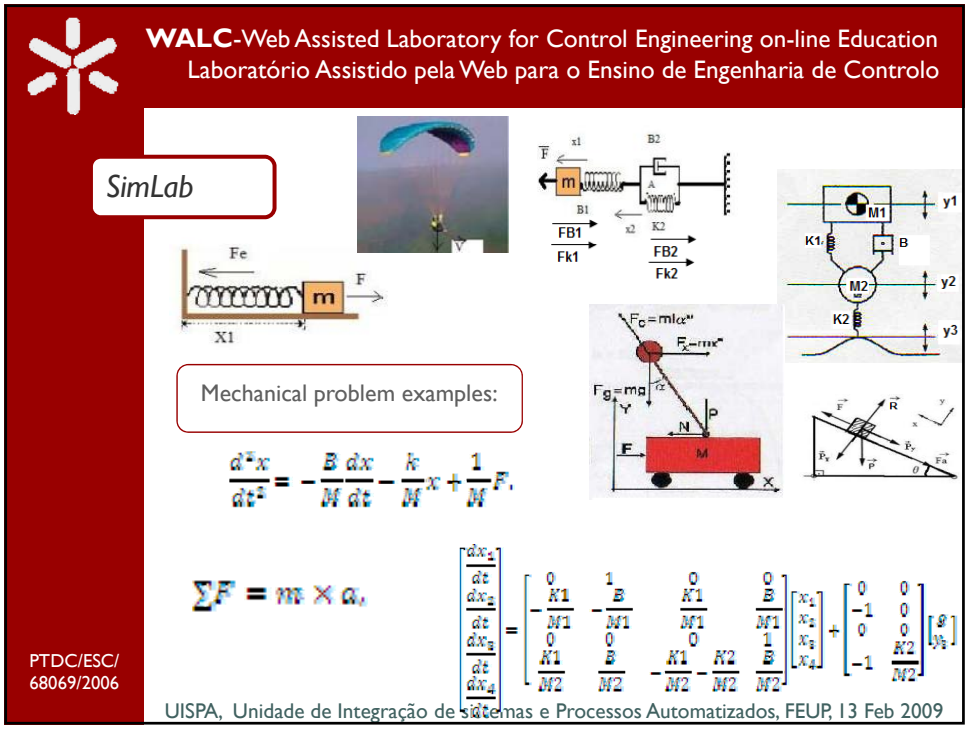
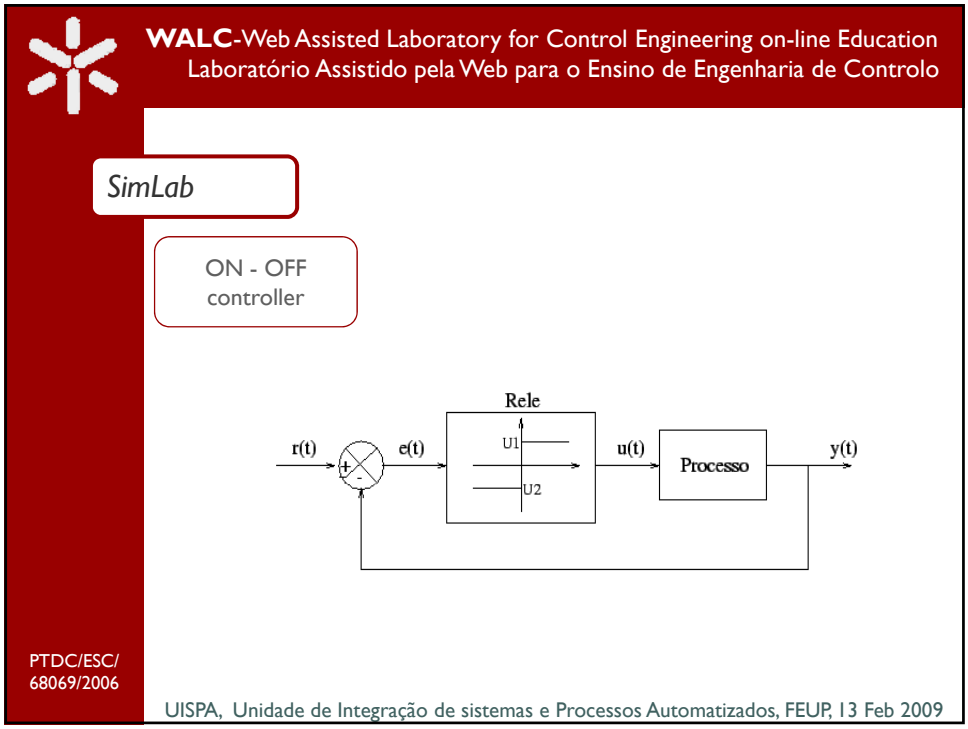
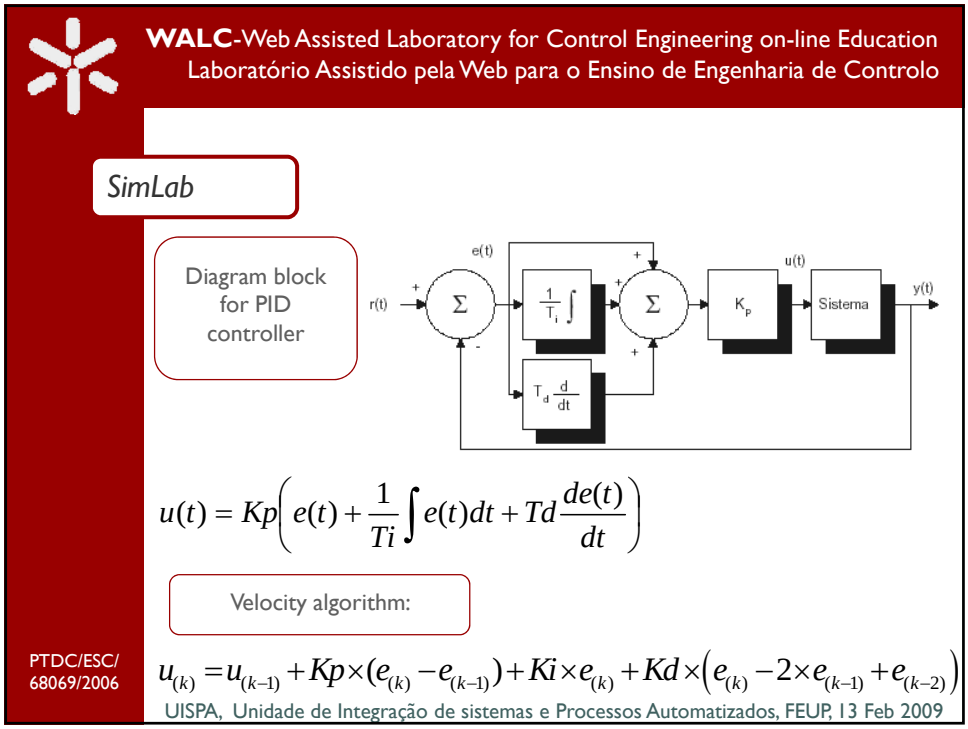






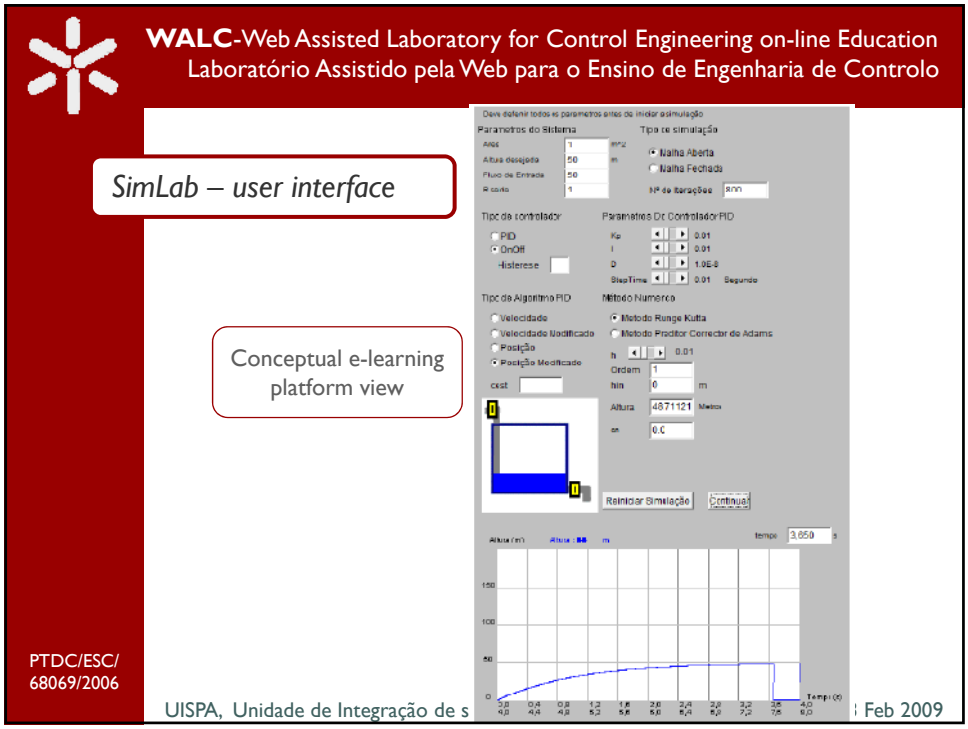


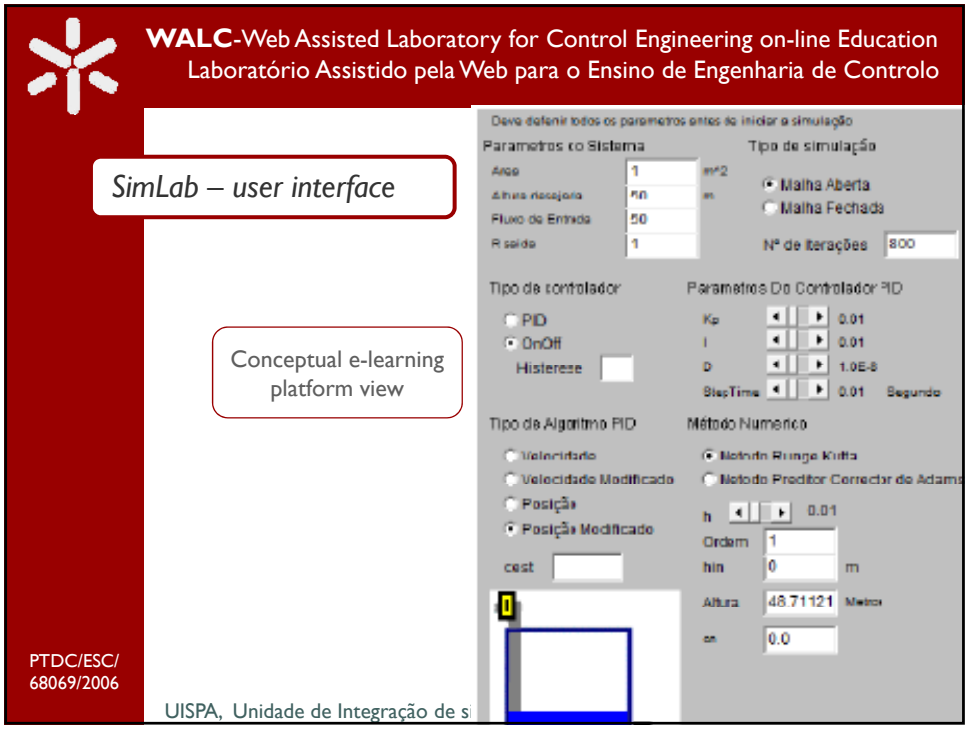


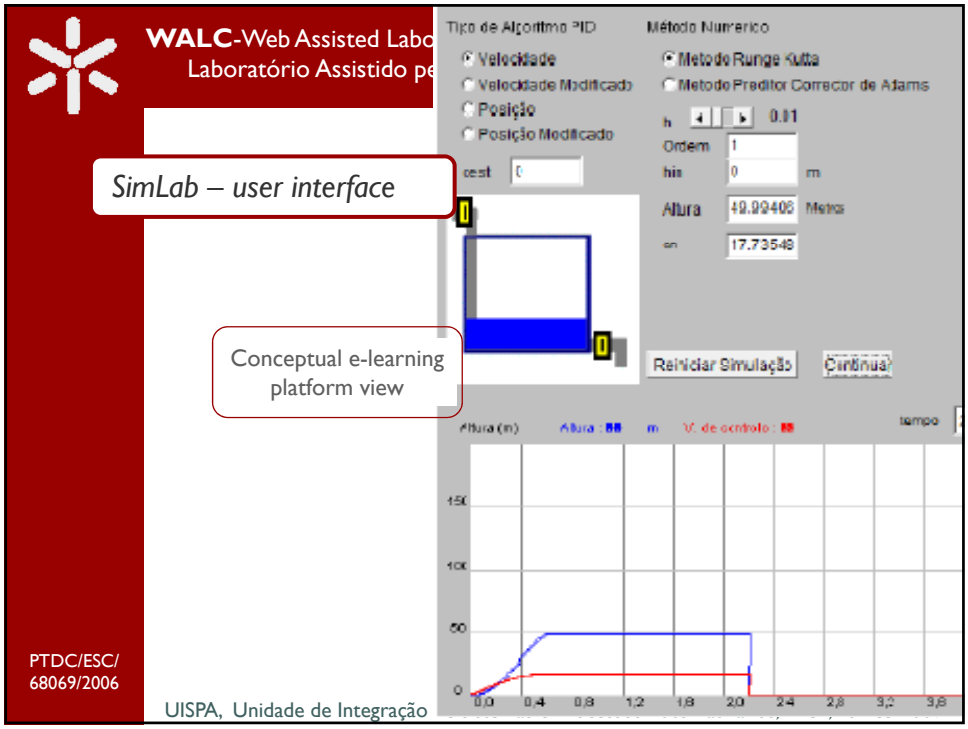


$$u(t) = Kp\left(e(t) + \frac{1}{Ti}\int e(t)dt + Td\frac{de(t)}{dt}\right)$$

$$u_{(k)} = u_{(k-1)} + Kp\times(e_{(k)} - e_{(k-1)}) + Ki\times e_{(k)} + Kd\times\left(e_{(k)} - 2\times e_{(k-1)} + e_{(k-2)}\right)$$






WALC-Web Assisted Labo
Laboratório Assistido pe
SimLab – user interface
Conceptual e-learning platform view
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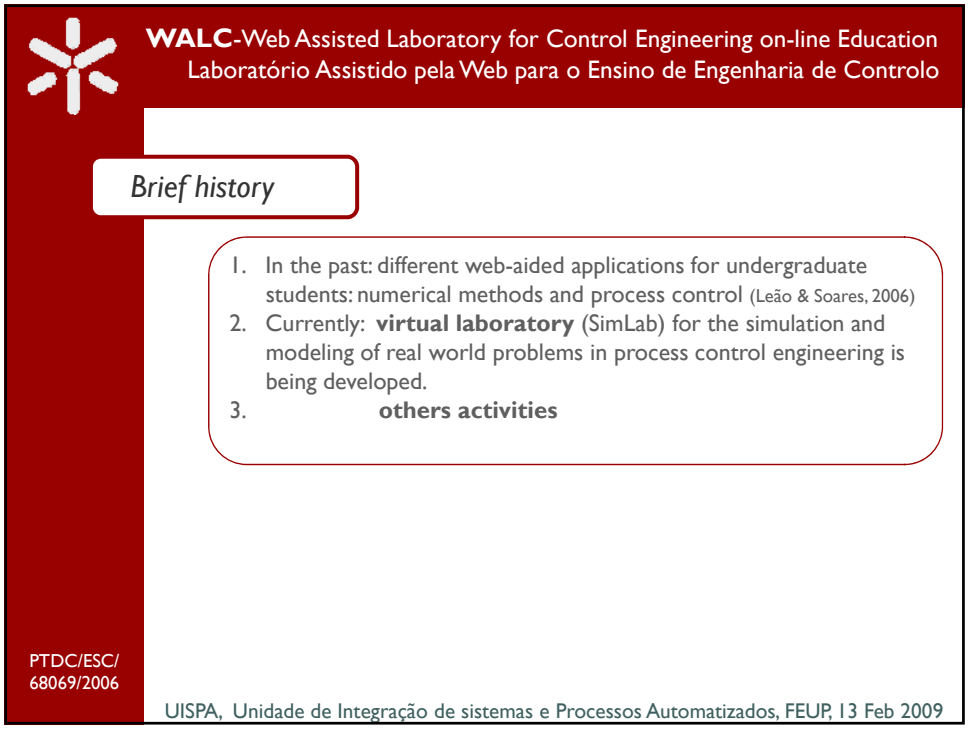
Tipo de Algoritmo PID
Método Numerico
Velocidade
Velocidade Modificado
Posição
Posição Modificado
Metodo Runge Kutta
Metodo Preditor Corrector de Adams
Ordem
Altura
Reiniciar Simulação
Continua
tempo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Didactic Kits

I – Crossroad traffic light management

Automobiles can only circulate in one direction.
Pedestrians can use which ever zebra crossing they choose, as long as they activate the green button, to ask permission for crossing the road.

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Didactic Kits

II – Contest queue management system

Control system for a contest queue management system, used in a public competition hold at the University of Minho.

This public competition, the promotion of the School of Engineering, involved four groups of pupils of different schools, from secondary to professional.

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Learning Activities of MN and PC courses

Set-up of the experiment
"Intelligent House"

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Learning Activities of MN and PC courses

Several features:
staircase illumination,
alarm intrusion,
automatic internal illumination
and entrance door opening
control

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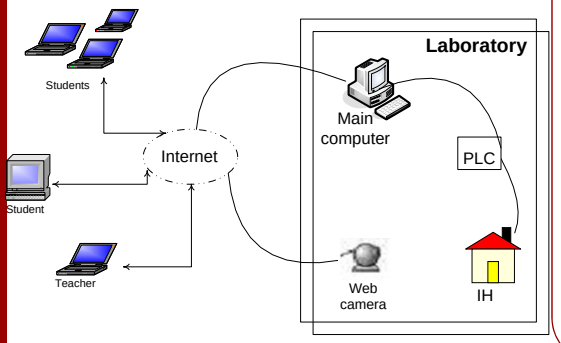
Learning Activities of MN and PC courses



The program developed in LabVIEW also permits the remote control of the IH through the visualization by a WebCam (Trust, 120 Spacecam). The set-up has a camera for viewing and monitoring, and is designed to provide to students real-time experiments via the Internet.

Basic scheme of the remote lab for the IH

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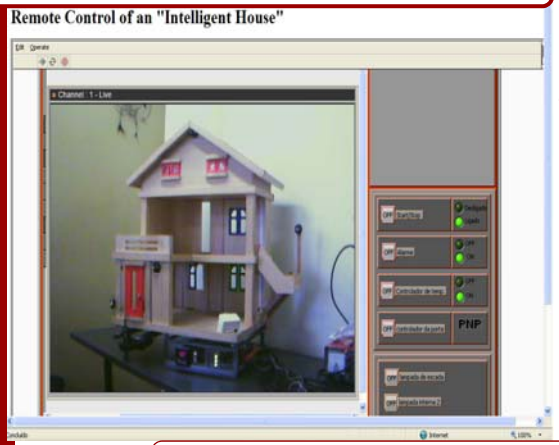
Learning Activities of MN and PC courses



The needed Webcam drivers were installed in the computer.

The IH controls permits the publication of the IH on the Internet.

Lab View front panel and block diagram Interface of the Webcam for monitoring and remote control of the IH.

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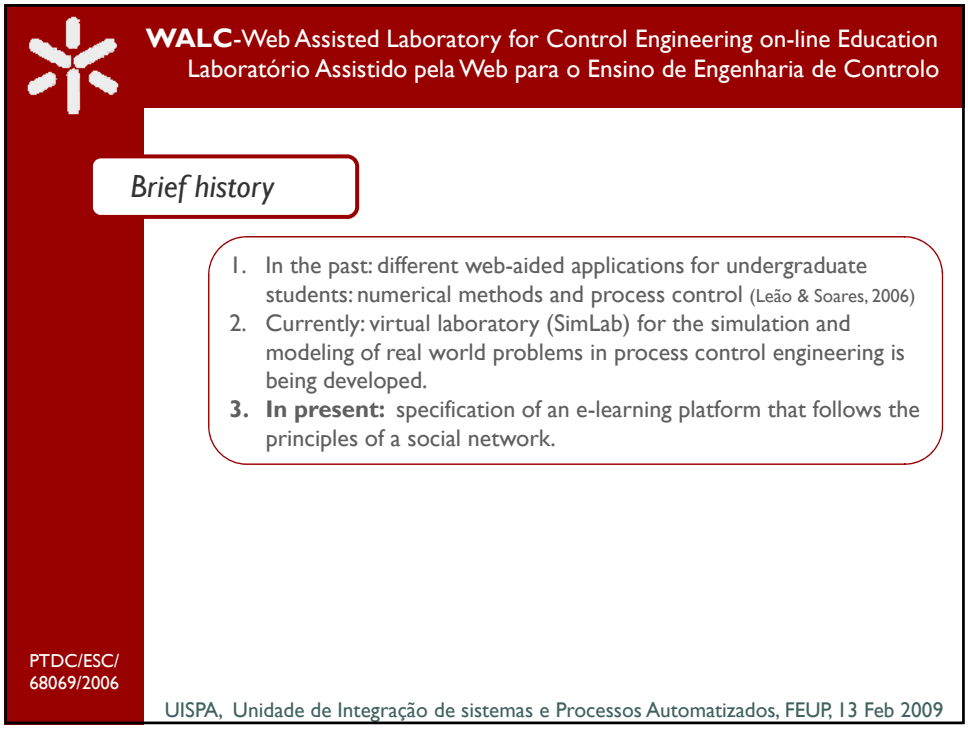
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2. Currently: virtual laboratory (SimLab) for the simulation and modeling of real world problems in process control engineering is being developed.
3. In present: specification of an e-learning platform that follows the principles of a social network.
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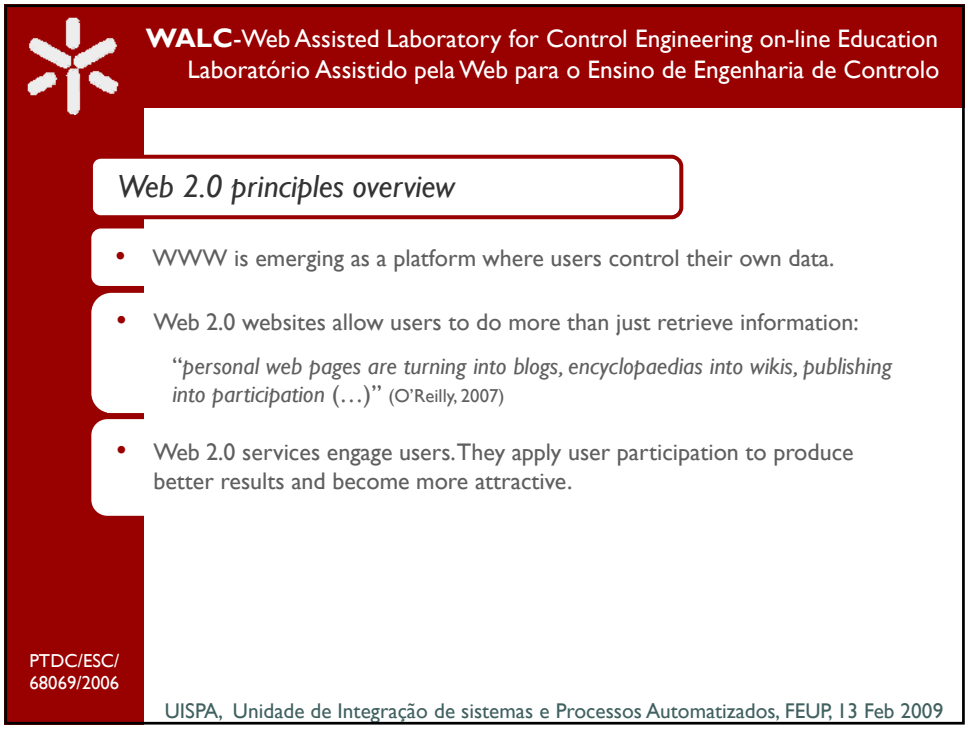
WALC-Web Assisted Laboratory for Control Engineering on-line Education
Laboratório Assistido pela Web para o Ensino de Engenharia de Controlo
Web 2.0 principles overview
• WWW is emerging as a platform where users control their own data.
• Web 2.0 websites allow users to do more than just retrieve information:
"personal web pages are turning into blogs, encyclopaedias into wikis, publishing into participation (…)" (O'Reilly, 2007)
• Web 2.0 services engage users. They apply user participation to produce better results and become more attractive.
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E-learning 2.0 environment features

High-level requirements that should be met by our social platform:

1. Personalisation;
   - Students should be able to construct their own learning process.
2. User as contributor;
   - Students publish their work: exercises and experiments results, pointers to different types of documents.
3. Integration and search of distribution content;
   - Provides a means for students integrate, remix and made content available to other students.
4. Rich user experience;
   - Enables the integration of different social network platforms: YouTube, Flickr, …
5. Synchronous and asynchronous interaction.
   - Communication as a very important tool in students learning process.

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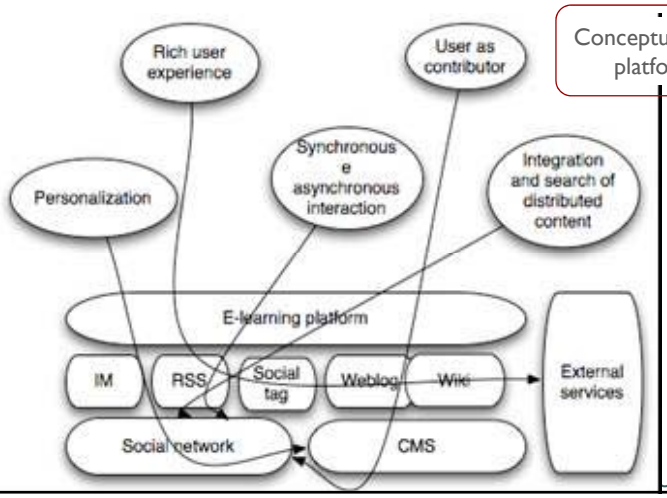
Platform specification and implementation overview



Conceptual e-learning platform view

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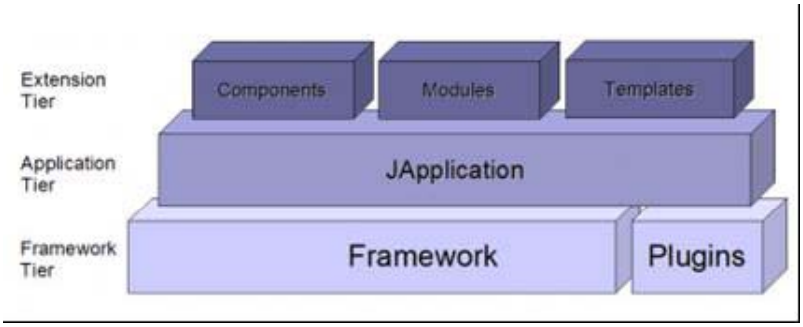

Joomla content management system reference model
(http://demo.joomla.org)

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conclusions & future work

- Present our motivation for the design and implementation of a user-centred, dynamic and shared Web site to support the learning activities for university students.
- Tools developed by students for students.
- Multidisciplinary project building the bridge between MN and PC (apparently with no relationship)

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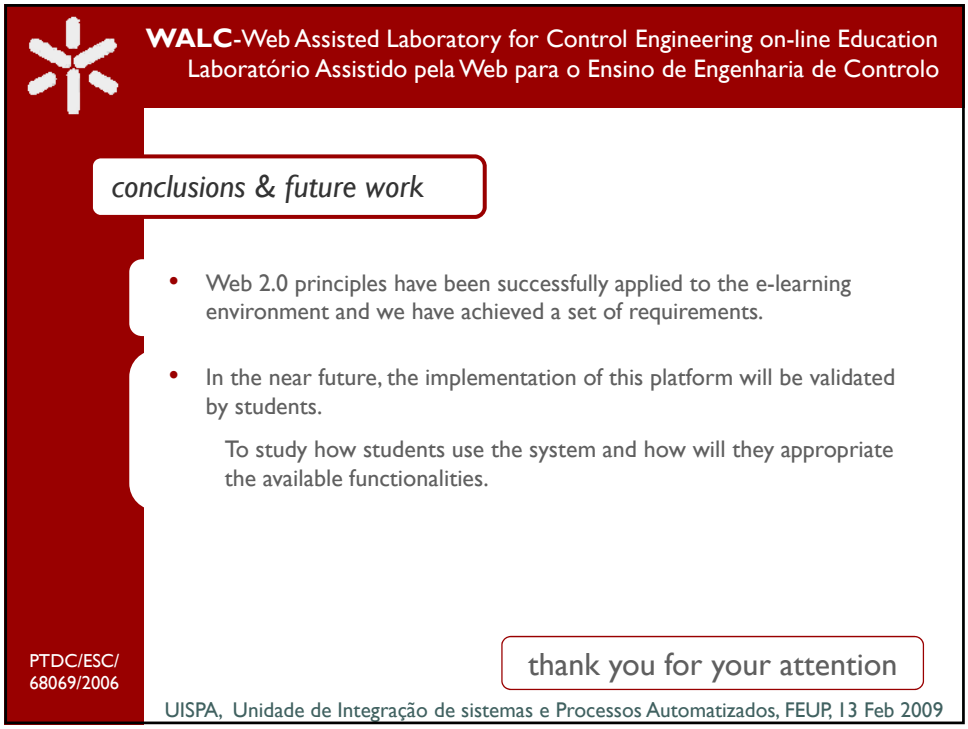
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conclusions & future work
Web 2.0 principles have been successfully applied to the e-learning environment and we have achieved a set of requirements.
In the near future, the implementation of this platform will be validated by students.
To study how students use the system and how will they appropriate the available functionalities.
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thank you for your attention
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