



Virtual Laboratory in Mechatronics: Access to Remote and Virtual e-Learning

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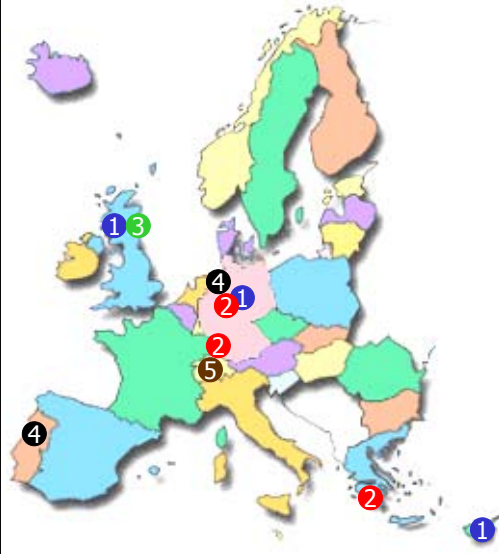


Introduction to MARVEL



- A European Leonardo da Vinci pilot project
- Focused on vocational training in mechatronics
- Project partners from different sectors
- Special attention to needs of work process oriented e-Learning
 - Integration of e-Learning into practical learning sequences
 - Virtual learning in combination with learning in laboratories, at work places, ...

Project partners



1 Vocational/Technical colleges

- DEL (Germany)
- HTI (Cyprus)
- WLC (Scotland)

2 Enterprises

- ZENON (Greece)
- FESTO (Germany)
- BNW (Germany)

3 Qualification authority

- SQA (Scotland)

4 Universities

- FEUP (Portugal)
- Uni Bremen/artec (Germany)

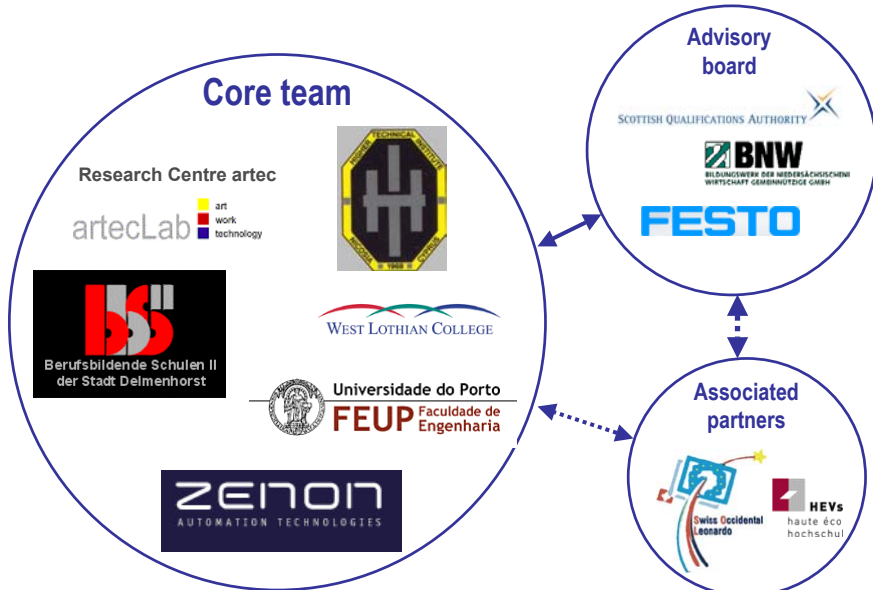
5 Associated partner

- FEUP (Switzerland)
- HEV (Switzerland)

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Consortium structure



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Example of a learning platform used in MARVEL



■ Learning platform “Mixed Reality Laboratory for Mechatronics”

- laboratory/workshop facilities accessible via the Internet
- supports collaborative learning between distant sites (home, school, work place laboratory)
- integration of real and virtual media

■ Concept and development

- Research Centre artec/artecLab: 
- funded by EU-IST-Projects:



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WWW Front-end



The screenshot shows a web browser window displaying the 'WWW Front-end' interface. The interface is divided into two main sections. On the left, a 'Virtual lab' is shown, featuring a 3D simulation of a mechatronic system with various components and connections. On the right, a 'Physical (real) lab' is shown, displaying a photograph of a physical mechatronic setup on a breadboard. Below the physical lab image, there is a login form with a 'Username:' label and a 'login' button. The browser window title is 'Virtual Construction Kit - Internet Explorer' and the address bar shows 'http://124.152.68.28/attach.html?name=www'. The interface also includes a 'Save' button, 'Show Help', 'Hints', and 'Leave' options.

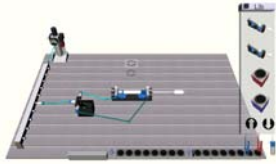
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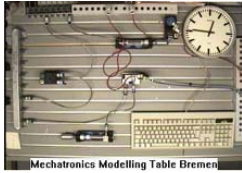
Different learning settings



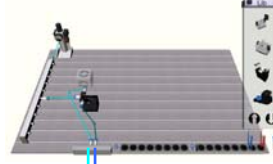
1. Pure virtual setting (virtual lab)



2. Pure 'real' setting (remote lab)



3. Distributed Mixed Reality setting

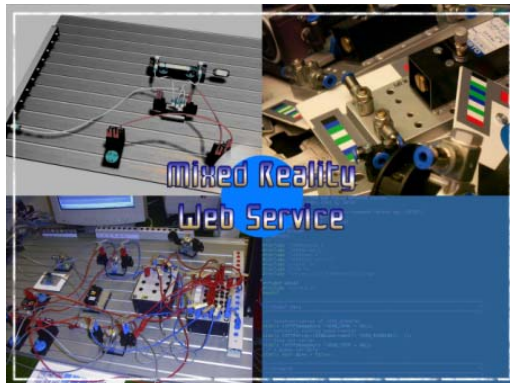


„air through the Internet“



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<http://lab.artec.uni-bremen.de>

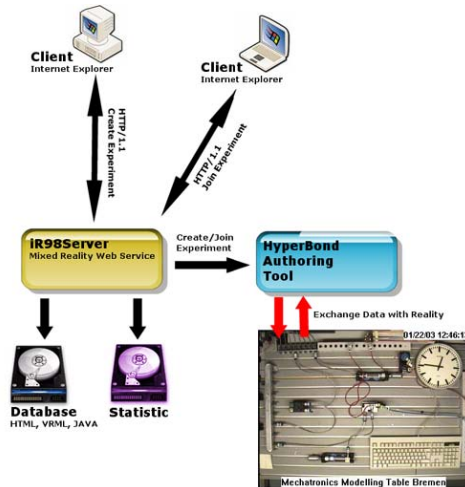
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Mixed Reality Web Service (System architecture)



- Available 24hours a day
- HTTP/1.1 based
- Multi-lingual content
- Hypermedia based help



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User Feedback



- Done several evaluations
- Positive feedback from teachers and students
 - Combination of real and virtual media is good
 - Easy and straight forward connection mechanism
 - Integrated simulation offers new teaching aspects
- Critic
 - Improved virtual component list
 - Additional materials for the experiments



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Contact



Learning platform “Mixed Reality Laboratory for Mechatronics”:

<http://lab.artec.uni-bremen.de>



MARVEL Home page:

<http://www.marvel.uni-bremen.de>