

MoRobE - Modern Shared Robotic Environment

DE/09/LLP-LdV/TOI/147252

<http://www.adam-europe.eu/adam/project/view.htm?prj=5158>

Project Information

- Title: MoRobE - Modern Shared Robotic Environment
- Project Number: DE/09/LLP-LdV/TOI/147252
- Year: 2009
- Project Type: Transfer of Innovation
- Status: completed
- Country: DE-Germany
- Marketing Text: With a state-of-the-art ICT based distance learning system, integrated into a comprehensive concept, project MoRobE supported the education in the fields of mechatronics, computer science and robotic engineering.
- Summary: With project MoRobE we focused on the Mechatronics and Computer Science sectors by the fact that companies in Europe are faced with enterprises from third party countries.

The main concept the former Interstudy consortium developed together was a modular platform for programming robots over the Internet. This approach offers the possibility to use the system from every PC connected to the Internet and to perform practical studies from home. We have also implemented an option to share the platform between different schools and facilities, for the aspect of cost reduction. Therefore the chance for adoption in the vocational education is highly increased.

The aspect of home practicing also higher the chance for adoption by working technician in the area of lifelong and continues learning, since they can organise their workload by themselves. In addition we transfered the so called "Home Lab", a modular microcontroller KIT which gives the possibility to students to have laboratory equipments at home.

We solved the issues mentioned at the beginning with a transfer of the robotic platform from tertiary education to the vocational one, aswell as an import of the products from Estonia to Germany.

The main outcome is a shared ICT based educational environment for vocational schools with support of a special curriculum and practical study aids.

Description: Serious problems are existing in the continuous and vocational education with the practical learning process. In continuous education the main problem is lack of time of practicing employees to participate in night schools or labs to deepen their knowledge. For vocational education the main problem is the availability of (often expensive) ICT based learning material for the classes. And another common problem is to exploit new internet technology for practical education in the field.

- Themes: *** ICT
 *** Lifelong learning
 *** Higher education
 *** Open and distance learning
 ** Utilization and distribution of results
 ** Quality
 ** Continuous training
 ** Initial training
 * Sustainability
 * Enterprise, SME
- Sectors: *** Information and Communication
 *** Education
 ** Professional, Scientific and Technical Activities

Product Types: teaching material
 program or curricula
 website
 others
 modules

Project Information

open and distance learning
CD-ROM

Product information: The project outcomes are the following products, belonging to a comprehensive Robotic Teaching and Learning concept:

- Learning situations for practical mechatronics and computer science training
- Network of Excellence, a wiki based website
- Distance Lab (real equipment behind the user interface)
- Virtual Lab (simulated environment behind the user interface)
- Study Material

Projecthomepage: <http://www.morobe.de/>

Project Contractor

Name: Bochum University of Applied Sciences
City: Bochum
Country/Region: Nordrhein-Westfalen
Country: DE-Germany
Organization Type: university/Fachhochschule/academy
Homepage: <http://www.hs-bochum.de/>

Contact Person

Name: MIRO-Lab, Sven Seiler and Carsten Köhn
Address: Lennerhofstr. 140
City: Bochum
Country: DE-Germany
Telephone: +49 (234) 32 10334
Fax:
E-mail: mirolab@hs-bochum.de
Homepage: <http://www.hs-bochum.de/fbe/>

Coordinator

Name: Bochum University of Applied Sciences
City: Bochum
Country/Region: Nordrhein-Westfalen
Country: DE-Germany
Organization Type: university/Fachhochschule/academy
Homepage: <http://www.hs-bochum.de/>

Contact Person

Name: MIRO-Lab, Sven Seiler and Carsten Köhn
Address: Lennerhofstr. 140
City: Bochum
Country: DE-Germany
Telephone: +49 (234) 32 10334
Fax:
E-mail: mirolab@hs-bochum.de
Homepage: <http://www.hs-bochum.de/fbe/>

Partner

Partner 1

Name: Helsinki University of Technology
City: Helsinki, Espoo
Country/Region: Väli-Suomi
Country: FI-Finland
Organization Type: university/Fachhochschule/academy
Homepage: <http://www.tkk.fi>

Partner 2

Name: Tallinn University of Technology
City: Tallinn
Country/Region: Eesti
Country: EE-Estonia
Organization Type: university/Fachhochschule/academy
Homepage: <http://www.ttu.ee/>

Partner 3

Name: ITT Group
City: Viljandi
Country/Region: Eesti
Country: EE-Estonia
Organization Type: SME - small and medium-sized enterprise (up to 250 employees)
Homepage: <http://www.ittgroup.ee/index.php>

Partner 4

Name: Berufskolleg am Haspel
City: Wuppertal
Country/Region: Nordrhein-Westfalen
Country: DE-Germany
Organization Type: others
Homepage: <http://www.berufskolleg-am-haspel.de>

Project Files

2011-04-28 - Final paper_print_out.pdf

http://www.adam-europe.eu/prj/5158/prj/2011-04-28%20-%20Final%20paper_print_out.pdf

Sell, R.; Seiler, S.: "Integrated Concept for embedded system study", in MSM 2011, Proceedings of the 7th International Conference Mechatronic Systems and Materials (MSM 2011), 7 – 9 July, 2011, Kaunas, Lithuania, ISSN 1822-8283

Concept_didactically_overview.png

http://www.adam-europe.eu/prj/5158/prj/Concept_didactically_overview.png

The didactical overview of the Robotic Teaching and Learning Concept

Concept__hardware_part_overview.jpg

http://www.adam-europe.eu/prj/5158/prj/Concept__hardware_part_overview.jpg

This image introduces the hardware part of the Robotic Teaching and Learning Concept.

Dissemination_2010-03-23_DAAAM_Baltics.pdf

http://www.adam-europe.eu/prj/5158/prj/Dissemination_2010-03-23_DAAAM_Baltics.pdf

Seiler, S.; Sell, R.: "VIRTUAL ACADEMY PLATFORM SUPPORTED BY A SEMANTIC KNOWLEDGE BASE", The 7th DAAAM Baltic Conference, Tallinn, Estonia, 22-24th April 2010, Tallinn University of Technology, ISBN: 978-9985-59-982-2

Dissemination_2010-11-15 - SIMPAR_2010.pdf

http://www.adam-europe.eu/prj/5158/prj/Dissemination_2010-11-15%20-%20SIMPAR_2010.pdf

Sell, R.; Seiler, S.: "Combined Robotic Platform for Research and Education", in Proceedings of SIMPAR 2010 Workshops Intl. Conf. on SIMULATION, MODELING and PROGRAMMING for AUTONOMOUS ROBOTS, Darmstadt (Germany) November 15-16, 2010, ISBN 978-3-00-032863-3, pp. 522-531

Dissemination_2011-05-17_AK_robotid.mp4

http://www.adam-europe.eu/prj/5158/prj/Dissemination_2011-05-17_AK_robotid.mp4

Dissemination activity - Presentation of concept in Estonian national TV.

Dissemination_2011-05-26_eLearning_Baltics.jpg

http://www.adam-europe.eu/prj/5158/prj/Dissemination_2011-05-26_eLearning_Baltics.jpg

Dissemination activity - MoRobE presentation at the eLearning Baltics

Dissemination_2011-05-26 - eLearning Baltics.pdf

http://www.adam-europe.eu/prj/5158/prj/Dissemination_2011-05-26%20-%20eLearning%20Baltics.pdf

Seiler, S.; Sell, R.: "Comprehensive Blended Learning Concept for Teaching Micro Controller Technology", in eLearning Baltics 2011, Proceedings of the 4th International eLBa Science Conference, Rostock (Germany) May 26-27, 2011, ISBN 978-3-8396-0258-4, pp. 15-24

Dissemination_2011-05-27_eLearning_Baltics_full_presentation.zip

http://www.adam-europe.eu/prj/5158/prj/Dissemination_2011-05-27_eLearning_Baltics_full_presentation.zip

Dissemination activity - Full presentation in eLearning Baltics conference

Products

- 1 P2 - Network of Excellence
- 2 P4 - Virtual Lab (simulated environment behind the user interface)
- 3 P5 - Learning Situations
- 4 P1 - Curriculum Module for practical mechatronics and computer science training
- 5 P3 - DistanceLab (real equipment behind the user interface)
- 6 P10 - HomeLab kit
- 7 P8 - Robotic Teaching and Learning Concept
- 8 P7 - Didactic Explanation
- 9 P9 - Hints and Help

Product 'P2 - Network of Excellence'

Title: P2 - Network of Excellence

Product Type: website

Marketing Text: The Network of Excellence provides a full set of pedagogical material for the education of mechatronics and computer sciences in a modern eLearning environment.

Description: The network is built up to base system started as the implementation of Interstudy project. Network base is a unique environment for the users. User can be either the student or teacher. Students can access the tasks on different levels, examples how to run different algorithms on the Home-Lab and discuss or ask help from the supervisors. Teacher can access in addition to the solutions of the task and restricted area for discussing by the colleagues or supporter. In addition the system was built-up on the Wiki environment, meaning that the self-updating logic is built in and all participants can improve and develop new content for the network. During the project the network has been enhanced by the several functionality (commenting the page, teacher group management, multi-language) and translations to German language.

Target group: The Network of Excellence aims at vocational schools, aswell as universities as target group.

Result: The result of the Network of Excellence is a wiki based eEnvironment with continued updated medagogical material for the education of pupils and students in mechatronics and computer science. It aims to provide full material for educating the target groups in the use of microcontroller systems. The two most important advantages of the system are, that is well-kept in English, German and Estonian language and that it provides a collaborative platform for teaching staff.

Area of application: The educational material in the Network of Excellence can be used in the daily education of mechatronics and computer sciences.

Homepage: <http://home.roboticlab.eu/>

Product Languages: Estonian
English
German
Turkish
Russian
French
Finnish

product files

Network of Excellence

NoE_Concept.png

http://www.adam-europe.eu/prj/5158/prd/1/2/NoE_Concept.png
Network of Excellence - Robotic Concept view

NoE_Forum.png

http://www.adam-europe.eu/prj/5158/prd/1/2/NoE_Forum.png
Network of Excellence - International Forum

Overview_NoE_books.png

http://www.adam-europe.eu/prj/5158/prd/1/2/Overview_NoE_books.png
Picture of the Network of Excellence with additional learning material

product files

Product 'P4 - Virtual Lab (simulated environment behind the user interface)'

Title: P4 - Virtual Lab (simulated environment behind the user interface)

Product Type: open and distance learning

Marketing Text: Easy to handle, easy to start with! - The Virtual Micro Controller Environment (VMCU) allows simulated hardware access to everyone, directly in any modern web browser.

Description: The VMCU behaves like real hardware, but is a fully simulated micro controller device, based on the HomeLab kits, for teaching embedded systems and micro controller technology. It virtualizes the common add-on boards, like the StudyBoard with LEDs, buttons and graphical displays, 7segment display, directly accessible with any modern Internet browser.

Target group: Pupils and Teachers (secondary (vocational) educational level), as well as Students, Lecturer and Researchers (thirds level of education) and also interested self-learners may profit from the VMCU environment.

We are addressing the sectors of Mechatronics, Electrical Engineering and Computer Sciences with this system.

Result: The VMCU is a Internet-accessible, software platform based on Java, which can accessed directly via <http://vmcu.ihoch2.de/> or also in the embeded DistanceLab environment.

Area of application: The VMCU platform can be used in the education of embedded devices and micro controller technology at the start up.

Homepage: <http://vmcu.ihoch2.de/>

Product Languages: English

product files

Virtual Micro Controller Environment

VMCU_controller_large.jpg

http://www.adam-europe.eu/prj/5158/prd/2/2/VMCU_controller_large.jpg
Virtual Micro Controller device

VMCU_Environment.jpg

http://www.adam-europe.eu/prj/5158/prd/2/2/VMCU_Environment.jpg
A view of the Virtual Micro Controller Environment. This picture illustrates the VMCU device at the left and a programming editor at the right side.

VMCU_login_page.jpg

http://www.adam-europe.eu/prj/5158/prd/2/2/VMCU_login_page.jpg
Login page of the VMCU environment

Product 'P5 - Learning Situations'

Title: P5 - Learning Situations

Product Type: teaching material

Marketing Text: Ready-to-use learning situations for vocational schools, for teaching micro controller technology

Description: The developed learning situations are covering all aspects of teaching micro controller technology and embedded systems, by including technical content as well as didactical proposals for education in class.

Target group: Teachers in vocational schools, gymnasium or technical secondary schools.

We are addressing the following sectors:

- Mechatronic
- Computer Science
- Electrical Engineering

Result: Brochure, 26 pages with full project description for directly applying the learning situation in class.

Area of application: Teachers can use these learning situations for preparing their lessons. The content is for teaching four month micro controllers

Homepage:

Product Languages: German

product files

Learning Situations

MoRobE_Didaktische_Begrueundung_zur_Lernsituation.pdf

http://www.adam-europe.eu/prj/5158/prd/3/2/MoRobE_Didaktische_Begrueundung_zur_Lernsituation.pdf

MoRobE_Lernsituation.pdf

http://www.adam-europe.eu/prj/5158/prd/3/2/MoRobE_Lernsituation.pdf

Lernsituation zum Thema: "Projektierung einer Spritzgussanlage" auf Basis der im Projekt MoRobE entwickelten Produkte, integriert in das "Robotic Teaching & Learning Concept".

Product 'P1 - Curriculum Module for practical mechatronics and computer science training'

Title: P1 - Curriculum Module for practical mechatronics and computer science training

Product Type: program or curricula

Marketing Text: Ready made curriculum module for teaching embedded systems and micro controller technology

Description: The "Curriculum Module" is a compilation of courses and course content, which shows an educational qualification for vocational education in the field of microcontroller programming in mechatronics and computer science. For methodology also includes e-learning support, practical exercises and support for teachers. It is a full service set, which can be easily implemented in schools.

Target group: Teachers in vocational schools, gymnasium or technical secondary schools.

We are addressing the following sectors:

- Mechatronic
- Computer Science
- Electrical Engineering

Result: The curriculum module provides the framework for the other products. In it, the other products picked up and created the content of the curriculum.

Be the entire curriculum, with its complementary base products (Distance Lab, Virtual Lab, Network of Excellence, etc.) can thus relatively easily integrated into existing curricula and thereby help improve the practical training in the field of microcontroller programming.

Area of application: For using in the didactically annual plan

Homepage:

Product Languages: German

product files

Curriculum Module

Curriculum_30_08_11.pdf

http://www.adam-europe.eu/prj/5158/prd/4/2/Curriculum_30_08_11.pdf
Curriculum Module for Practical Mechatronics and Computer Science Training

Product 'P3 - DistanceLab (real equipment behind the user interface)'

Title: P3 - DistanceLab (real equipment behind the user interface)

Product Type: open and distance learning

Marketing Text: Labs and complex devices - easy accessible and programmable over the Internet!

Description: The Distance Lab allows the programming and accessing of devices and labs with video-feedback directly over the Internet. By its open software interface arbitrary labs may be integrated

Target group: Pupils and Teachers (secondary (vocational) educational level), as well as Students, Lecturer and Researchers (thirds level of education) and also interested self-learners may profit from the VMCU environment.

Result: Open web platform, with user management and booking system for accessing online labs.

Area of application: The DistanceLab can be used in the education of embedded devices and micro controller technology beginning in the

Homepage: <http://distance.roboticlab.eu/>

Product Languages: German
Estonian
English

product files

Distance Lab

DistanceLab_LearningPath.png

http://www.adam-europe.eu/prj/5158/prd/5/2/DistanceLab_LearningPath.png
Distance Lab - Learning path

DistanceLab_Login.png

http://www.adam-europe.eu/prj/5158/prd/5/2/DistanceLab_Login.png
Distance Lab - Login page

DistanceLab_VMCU_integration.png

http://www.adam-europe.eu/prj/5158/prd/5/2/DistanceLab_VMCU_integration.png
Distance Lab - Virtual Micro Controller Integration

Product 'P10 - HomeLab kit'

Title: P10 - HomeLab kit

Product Type: others

Marketing Text: Do real experiments at home.
Evolve your skills.
Be involved in robotic competitions!

Description: The HomeLab kits are mobile, ready to use small test stand packed into a case, which can be connected to PC and operated in computer class, at home or in working place. The aim of the kit is to provide a practical and effective hands-on training. Students may combine various solutions on different levels of complexity and functionality, based on the modules belonging to the kit. The main feature of HomeLab Kit is its mobility – the case is a small and compact box and all modules with necessary tools are seated into that. Taken the current development status into account, the HomeLab Kit offers for example hardware and exercises for 7-segment LED display, LCD (alphanumeric as well as graphical one), sensors (potentiometer, infrared, ultrasonic, etc.), different motors (DC, servo, stepper), as well as a networking module (for Bluetooth, Ethernet and ZigBee), a CAN module and USB for direct connection to PC (for example student home computer). Simple and easy to install software is used to connect main controller to computer. This is particularly important because the student can start practical experiments in school and then continue with self-learning at home or even in workplace.

The HomeLab kit is assisted by a specific software library, enabling easy accessing the modules which is available as Open Source for all users. More experiences users may abandon using it, but for beginners utilizing the library makes it a lot easier to start with micro controller programming

Target group: Pupils, vocational learners and students in the fields of Mechatronic, Electrical Engineering, Computer Science

Result: Real pieces of hardware, for self-educating of learners in home or for utilizing them in classes. The Kits are combined with specific modules for different domain (e.g. Automotive).

Area of application: Distance Learning, distance education, class education, included in a blended learning process

Homepage: <http://home.roboticlab.eu/en/kit>

Product Languages:

product files

HomeLab kits

Boards_with_white_BG.png

http://www.adam-europe.eu/prj/5158/prd/6/2/Boards_with_white_BG.png
HomeLab kits - Layered boards

kits-cases_without_bg.png

http://www.adam-europe.eu/prj/5158/prd/6/2/kits-cases_without_bg.png
HomeLab kits - Cases with hardware set

robots.png

<http://www.adam-europe.eu/prj/5158/prd/6/2/robots.png>
Robotic Applications based upon the HomeLab kit

product files

Product 'P8 - Robotic Teaching and Learning Concept'

Title: P8 - Robotic Teaching and Learning Concept

Product Type: program or curricula

Marketing Text: A comprehensive concept for Teaching and Learning Robotics

Description: This concept shows up how all developed products are fitting together and how they can be utilized in the education process of micro controller programming

Target group: The Robotic Teaching and Learning Concept aims at vocational schools, aswell as universities as target group.

Result: Paper, 1 page with the concept and the developed products

Area of application:

Homepage:

Product Languages: English

product files

Robotic Teaching and Learning Concept

Concept_didactically.png

http://www.adam-europe.eu/prj/5158/prd/7/2/Concept_didactically.png

Concept didactically

noe-task-report.png

<http://www.adam-europe.eu/prj/5158/prd/7/2/noe-task-report.png>

noe-task-report

Product Overview - new.pdf

<http://www.adam-europe.eu/prj/5158/prd/7/2/Product%20Overview%20-%20new.pdf>

Product overview

Product 'P7 - Didactic Explanation'

Title: P7 - Didactic Explanation

Product Type: program or curricula

Marketing Text: Description of planning and implementation of a complete project task

Description: The didactic Explanation describes the planning and implementation of a specific project task based on the resulting products of the project. The project task represents a concrete learning situation, which corresponds to the professional field of activity of students.

Target group: This product is intended for teachers in vocational schools, secondary schools and higher technical schools
We address here the sectors "Mechatronics", "computer science" and "Electrical Engineering"

Result: Brochure, 15 Pages with a didactic Explanation of a real project task.

Area of application: For using in the didactically annual plan

Homepage:

Product Languages: German

product files

Didactic Explanations

P7 - Didactic Explanation for the Learning situations.pdf

<http://www.adam-europe.eu/prj/5158/prd/8/2/P7%20-%20Didactic%20Explanation%20for%20the%20Learning%20situations.pdf>
Didactic Explanations

Product 'P9 - Hints and Help'

Title: P9 - Hints and Help

Product Type: program or curricula

Marketing Text: Didactic notes and solutions for the design of teaching ideas for the implementation of the learning situation.

Description: The Product provides concrete proposals and study materials for the implementation of the learning situation in education.

Target group: This product is intended for teachers in vocational schools, secondary schools and higher technical schools
We address here the sectors "Mechatronics", "computer science" and "Electrical Engineering"

Result: Brochure, 18 pages with Hints and Helps for education.

Area of application: For using in the didactically annual plan

Homepage:

Product Languages: German

product files

Hints and Help

P9 - Hints and help for implementing the Learning situation.pdf

<http://www.adam-europe.eu/prj/5158/prd/9/2/P9%20-%20Hints%20and%20help%20for%20implementing%20the%20Learning%20situation.pdf>
Hints and help for implementing the Learning situation

Events

Implementation Seminar

Date 14.09.2011

Description The idea of this seminar to hold an one-day seminar-workshop combined with final project meeting in Bochum in the end of project MoRobE.

Participants invited will be teachers and managers of mechatronic and computer science focused vocational schools in the catchment area of Hochschule Bochum. We like to inform them about project results and give information about potential implementation of Distance Lab, HomeLab kit and Virtual Microcontroller Environment in their institutions.

The following agenda seems suitable:

1. Short introduction (Overview of the project and results)
2. The solution demonstration and methodology overview
3. Practical tools for implementing it on the schools curriculum
4. Afternoon workshop (hands-on for participants to go through a demonstration exercise)

Target audience Teachers and managers of mechatronic and computer science focused vocational schools in the catchment area of Hochschule Bochum.

Public Closed event

Contact Information Sven Seiler, sven.seiler@hs-bochum.de
Participation is only possible when registering to this event - Target audience teachers will receive a invitation letter soon.

Time and place 14.09, 9:00h, Hochschule Bochum, Lennerhofstr. 140, 44801