

SOFTWARE FOR ROBOT CONTROL IN A VIRTUAL LABORATORY

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Abstract: The project “E-Laboratory Practical Teaching for Applied Engineering Sciences”, Acronym EPRAS, is implemented in the frame of the Hungary-Romania Cross-Border Co-operation Programme 2007-2013 (www.huro-cbc.eu) and is financed by the European Union through the European Regional Development Fund, completed by the co-financing of the two member states participating in the Programme, Hungary and Romania. The project implements a set of practical laboratory experiments designed for the students in applied engineering sciences, accessible from remote locations by using the internet.

1. Introduction

The project “E-Laboratory Practical Teaching for Applied Engineering Sciences”, Acronym EPRAS, is implemented in the frame of the Hungary-Romania Cross-Border Co-operation Programme 2007-2013 (www.huro-cbc.eu) and is financed by the European Union through the European Regional Development Fund, completed by the co-financing of the two member states participating in the Programme, Hungary and Romania.

The general objective of the programme is to bring the different actors – people, economic actors and communities – closer to each other, in order to better exploit opportunities offered by the joint development of the border area.

The project implements a set of practical laboratory experiments designed for the students in applied engineering sciences, accessible from remote locations by using the internet. To this end, it will be realised a software platform and 6 practical laboratory works, 3 at University of Oradea and 3 at University of Debrecen. This will allow to jointly use the facilities of the two universities, thus reducing the investments effort of both universities.

This paper will present one of the software’s used for viewing, uploading, and verifying the program used to control one of the ABB robots situated in the T001 laboratory of University of Oradea.

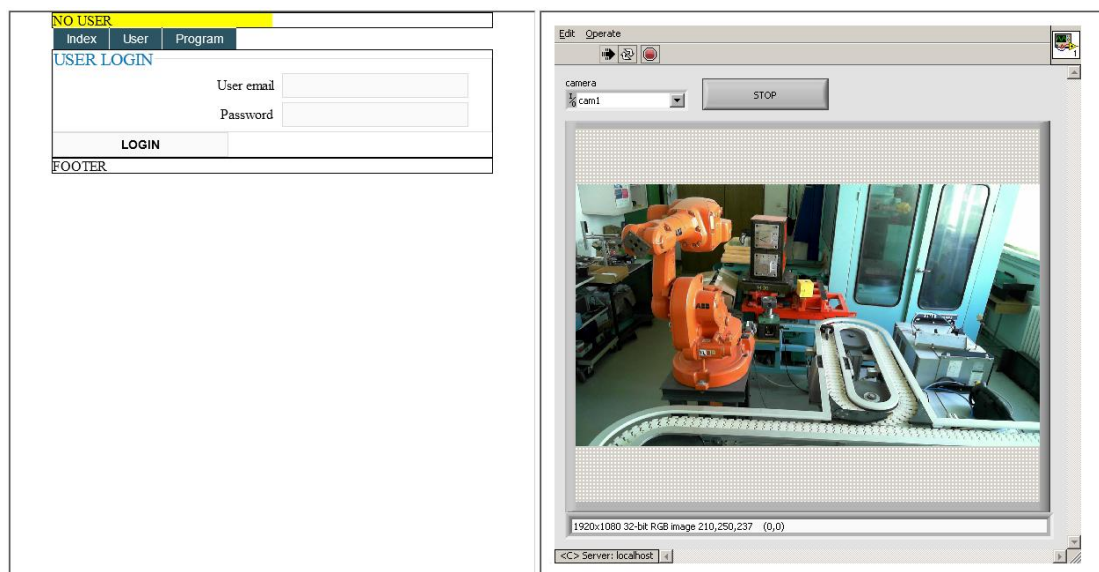


Figure 1. EPRAS RAPID program upload;

2. Presentation

The software have two distinct parts, one is written in PHP and using one MySQL database to store the RAPID programs, the second part is to view the movements of the ABB robot and is written in LabView.

2.1. PHP & MySQL

The software written in PHP uses one MySQL database to store the RAPID programs written by students. The database have two tables, one for user accounts for authentication and one for the RAPID programs written by students. The user table have the following structure:

- user_id, integer, auto increment, primary index
- user_email, text
- user_password, text
- user_level_id, integer

The table used to store the uploaded RAPID programs have the following structure:

- program_id, integer, auto increment, primary index
- program_date, date time
- program_user_id, integer
- program_text, text
- program_status, integer

After the authentication the student can see his previously uploaded RAPID programs and their status. The RAPID programs can have three states: pending, running and finished. In the administration part of the software the teacher can see and verify the RAPID programs uploaded by the students and if they are

a@b.com(2)				
Index	User	Program		
NR	ID	DATE	STATUS	REGISTER
1	8	2012-01-19 11:46:33	RUNNING	
2	7	2012-01-19 11:46:20	FINISHED	
3	1	2012-01-16 13:06:05	PENDING	EDIT
FOOTER				

Figure 2. uploaded RAPID rograms;

The verified RAPID programs can be uploaded directly to the robot controller using the RobotStudio application or trough a custom made software using the PC Interface of the robot controller.

2.2. LABVIEW

The second part of the software is made using the LabView programming environment.

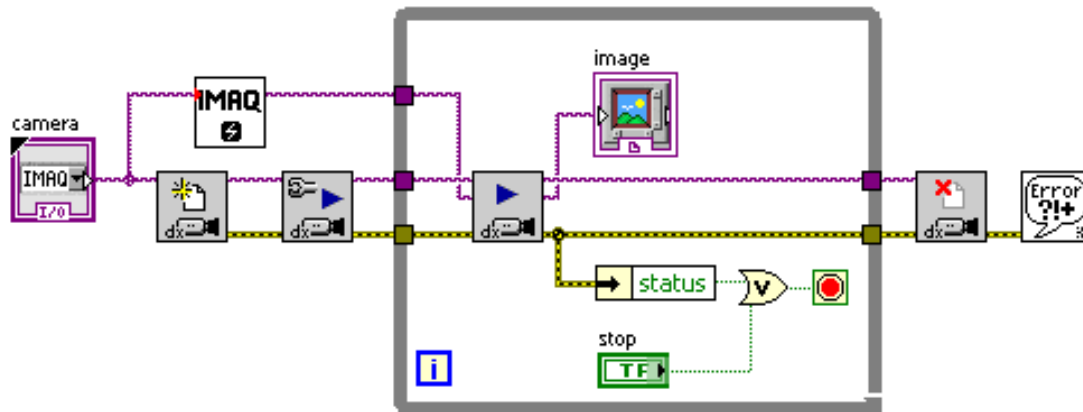


Figure 3. LabView program;

LabVIEW is system design software that provides engineers and scientists with the tools needed to create and deploy measurement and control systems through unprecedented hardware integration.

The NI LabVIEW graphical programming environment makes it easy to control and acquire data from any instrument over any bus. The programs made with LabVIEW can automate measurements from several devices, analyze data as acquired, and create custom reports all in a matter of minutes.

The LabView program using the NI-IMAQdx driver software which gives the ability to acquire images with IEEE 1394 and GigE Vision cameras. The high-level NI-IMAQdx VIs allows us to acquire images, open and close an interface, get/set attributes, get camera features and video modes, and configure triggered acquisitions. The low-level NI-IMAQdx VIs are for more direct control of the image acquisition hardware.

3. CONCLUSIONS

In the next months the system will be modified to check the syntax of the ABB robot RAPID program automatically, and a web interface will be constructed for automatic upload of the RAPID program.

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