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NEW VIRTUAL TECHNOLOGIES AND ENVIRONMENT

In praxis of technology workplaces with robots the computing technology is used. It is important the used technology to be independent to platform on which it will be presented and to use the newest standards in computer technologies. The aim of our project is to design suitable technology to implement computer model of virtual technological workplace. The result will be to teach and test manipulation control operations. Virtual workplace model simulates simple logics derived from real robotized workplace. Virtual industrial robot is for its simplicity of operation and simplicity of user access to functions especially suitable for teaching control and programming robots on various knowledge grades.

1. Basic principles of virtual robotized workplace

The main aim of automated laboratory modeling is simulation. It offers wide range of industrial robots use possibilities, enables to use the whole kinematics, which could not to be used in real robot because of manipulation equipment damage risk. The concept of virtual laboratory automated workplace has following advantages:

1 – decrease of risk in complicated and dangerous robot manipulations unlike in manual control,

2 – more transparency in robot control,

3 – elimination of the need to travel to the place of manipulation equipment and connected expenses,

4 – accessing the industrial robot control to students without access to control the real equipment,

5 –creating fully functional application that amends manual control in virtual form,

6 – the possibility to make various simplifications in control,

7 – instant availability at any time,

8 – the possibility to create components to expand the workplace peripheries,

9 – the possibility to work anywhere and anytime,

10 – generating of various statistic results that will be processed from any time interval of virtual laboratory work,

11 – more easily setting of work in various working modes,

12 – various peripheral corrections and manipulations,

13 – exchange of gained knowledge and statistics between workers and the possibility of broader data executing,

14 – creating of own programming interface for more simplification.

Additional important positive is creation of such program automated laboratory control environment which fulfills all ecology, ergonomic and functional conditions [3].

2. Design of actions to achieve project aims

One of additional aims is to create interface between the virtual simulation application and software interface which will directly control industrial robot by the means of hardware interface.

In the first phase the concept of project creation will be produced. Then the whole volume of work what and how to simulate will be defined. In the second phase the robotized workplace will be modeled. In this phase the actual state analysis of manipulator modes will be created and new practical functions will be designed to bypass some older non practical robot controls. The final phase will be testing. After testing the virtual application will be used in learning [2].

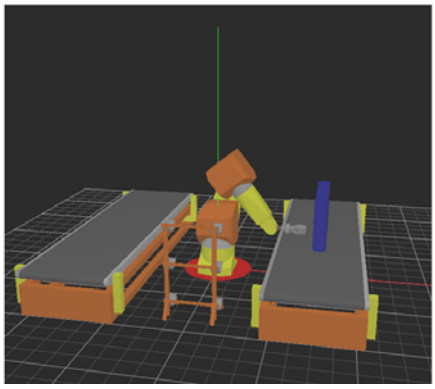

Fig. 1. Virtual simulation window

The final application in Fig.1 contains virtual scene with robot in scale 1:10 and enables robot control in modes: teaching (TIN), automatic run, step by step, editing. These modes offer full control of robot's whole kinematics.

2.1. Application interface design.

In the design phase it is important to define the interface between application and user [3]. Additional important condition of clear control is the user not to be cluttered up with a lot of control elements. There should be few control elements and also function should be clear at the first sight. In application of virtual automated workplace will be many control elements but will be ordered and integrated in the environment so that the usability will be unassuming, clear and fulfill all the user requirements [4].

Communication interface: in particular project parts the following standards will be used::

VRML 97 for virtual scene definition, COBRA 2.0 for assigning server vs. client communication, JAVA for programming of platform independent application.

It is important to design model parameters to be possible to expand it by adding parameters.

3. Conclusion

By keeping basic standards of information transmission and accepting sufficient transmission speed it is possible the student will train manipulation sequence on remote workplace. It means finance saving, it is not needed to build several robotized workplaces physical models but only model in computer and connection to software simulators.

The contribution was elaborated within the research project KEGA project No. 3/3111/05 *The creation of virtual robotic laboratory for supporing teaching the subject Robots and manipulators in a newly accredited study programme* and the research project KEGA project No. 3-7285-09 Integrácia obsahu a tvorba vysokoškolskej učebnice „Špe-

cializované robotické systémy“ písomnou a interaktívnou multimediálnou formou pre TU Zvolen, TnUAD Trenčín a STU Bratislava.

The paper is also aimed at contributing to the vision of the *Agenda 21* and *Lisbon Strategy* in the field of industrial pillars of sustainable development strategy at the STU MTF research and pedagogical processes

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Новые виртуальные технологии и виртуальная среда

Компьютерные технологии широко используются на практике при разработке рабочих мест, оснащенных роботами. Важным фактом является использование технологий независимо от платформ, на которых они будут установлены, и использование новейших стандартов компьютерных технологий.

Целью нашего проекта является разработка технологий для реализации компьютерной модели виртуального рабочего места.

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HCS MODEL 3E IN A VIRTUALLY CONTROLLED ROBOTIC WORKPLACE – PRACTICAL APPLICATIONS

Agenda 21 is accepted as the development aimed at assuring the basic individual demands of society without corrupting the environment and the ability of future generations to satisfy their own demands. Suggested HCS model 3E is addressed to acquire financial means necessary for sustainable development process progress in the framework of „National strategy of sustainable development of the Slovak Republic“. This article brings an example of HCS model 3E principles applying in a robot operators training virtual unit. The virtual development process presents an essential condition for a successful origin of a new product or a workplace. The scientific project is a logical continuation of the research activities of the interdisciplinary investigators group as well as it represents the follow-on contractual scientific cooperation of university workplaces on an international basis. The project concept is based on the sustainability of the HCS model 3E designed by us and verified in practice.