Strategic Trends in Virtual Technologies

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Abstract[1]

In praxis of technology workplaces with robots the computing technology is used. I tis importand the used technology to be independent to platform on which it will be presented and to use the newest standards in computer technologies [1] . 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.

The aim is to create fully functional virtual automated laboratory with industrial robot controlled as in praxis by personal computer.

Virtual industrial robot is for its simplicity of operation and simplicity of user access to functons especially suitable for teaching control and programming robots on various knowledge grades. Also it is possible to use it to train and examine industrial robot operators and programmers. The modeling theory is the part of larger project of virtual robotized technology workplace in laboratory conditions. Additional automated workplaces dedicated to be the periphery to industrial robot will be possible to add to virtual automatized complex simulation.

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;

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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 perifery 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.

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].

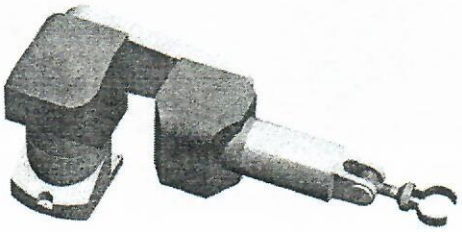

Figure 1. Virtual Simulation Window

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 fulfil all the user requirements.

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.

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