

VISUALIZING THE CREATION OF DYNAMIC SYSTEMS SIMULATIONS

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Abstract: In this paper comparison of the possibility of the creation of the program simulating dynamic systems are presented. There are shown advantages and disadvantages intended for the general package – JavaBeans and the package for the simulation of dynamic – PASION.

Also there are presented the suggestions multiplying the visualization of the simulating programs especially in the computing net.

Keywords: distributed programming, cooperating multiagent system, PASION.

INTRODUCTION

Before we form the simulation of the dynamic systems we should choose the language or program's package which will satisfy our criterions, such as:

- it would be able to solve different problems,
- it is the package which has been made to simulate components,
- it let programs to create,
- using language and package is free or cost very little.

In this moment there is very much languages, packages and program's platforms that satisfy all criterions but not criterion price. They are expensive. So we need the language or the package that are free (JAVA) or cost very little (PASION). Both programs permit creation the simulating systems with using units (JavaBeans) or standard units (PASION). If we use standard dynamic control units we need not know the mathematics description. We have to know only block diagram.

In JavaBeans the particular beans may be locate in Netware computing net. This haven't got PASION shown properties.

In this paper will be same suggestions create end employed simulate programs on the localhost end in Internet too. During simulate dynamic arrangement the visualization is situated in three stage:

1. Analyze of work of real system,
2. Create computer program,
3. Exit of output results.

VISUALIZING THE ACTION REAL ARRANGEMENT

Before we begin the creation of simulating dynamics arrangement the programmer has to recognize: detailed activity system, its structure, the functions of particular elements, relationship and dependences between units of system, simplification and so on.

Presentation dynamic's systems description with use block diagram which consist of typical elements of control system is very convenient. Fig.1 shows control system consisting of the typical dynamics units.

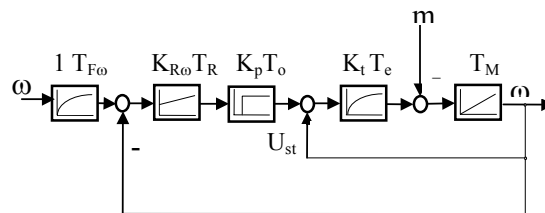


Fig.1. Block diagram of the direct speed control with the dc motor.

VISUAL ANALYZE OF ORGANIZATION PROGRAM OF SIMULATED ARRANGEMENT

Very important thing, with view point see of programmer, is graphic presentation concept of program. It can preserve us not to make deferent errors. Fig. 2 shows organization the calculating with use the specialist agents that have been situated in localhost or computing net [Tolwinski R 2002].

If we take advantage of client-server model in the computing net we should show how the calculation will be organized and where should be located particular objects in the net. On fig.3 the server has to parallel serves of many clients. Each new client which is approaching to server allocates a new thread. In the threads will be implement distinct objects.

VISUAL CREATION COMPUTING PROGRAM

One package and one platform in this paper will be discussed. These program give possibility edit

method. Fig. 4 shows the model prepared for simulation system on the fig. 1 with use the BDk's tool.



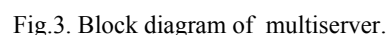
The choice of the structure's arrangement, parameters of controllers or approximating parameters particular control elements very facilitates multiply simulation with choosing parameters [Tolwinski R. 1999].

Fig.2. The flow signal between agents which simulate the direct speed control with the motor.

No one from existence systems today and net's standards is equipped in Graphic Unit Interface. Some systems as Parallel Virtual Machine have only program's cover having graphic console (XPVM, CUMUVS, HeNICE).

JavaBeans is proper for visually program. One bean can multiply use in many deferent programs. It can be used in integrating program tools, such as: JBuilder, BDK (Beans Development Kit) and so on. The components JavaBeans can be use in RMI (Remote Method Invocation), CORBA (Common Object Request Broker Architecture), DCOM (Distributed Component Object Method).

It is important especially when the number of used computers change in time to make simulation. Fig. 6 shows the visualization which base on the block diagram of multiserver on fig.3. On the choose monitor we can observe current client's configuration has been connected with multiserver. The multiserver works with the multithreads. Locks in the visualization of program in computing net



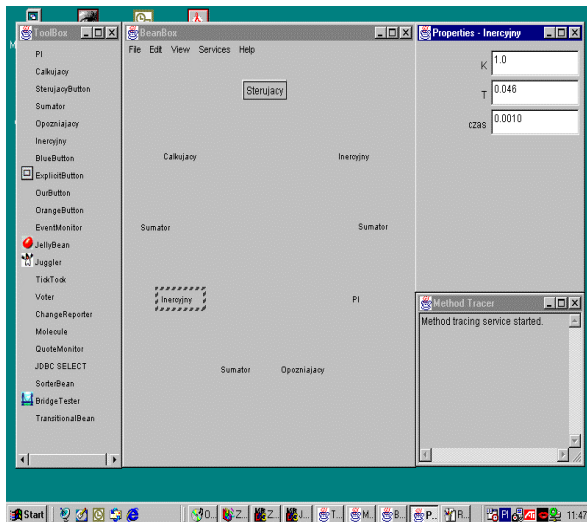


Fig.4. Properties-BeanBox window. Setting parameters of the Inertial beans.

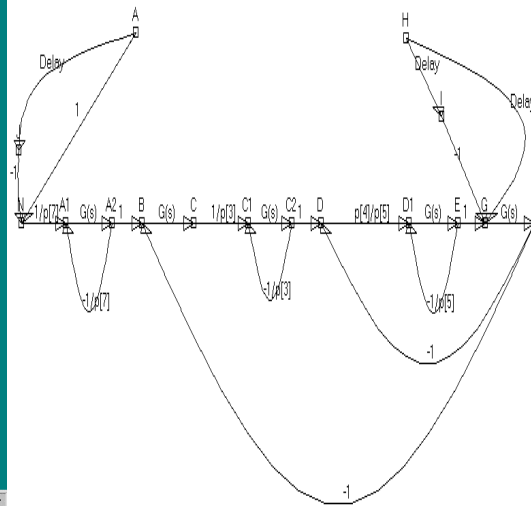


Fig.5. Diagram of direct speed control of dc motor presented in PASION package.

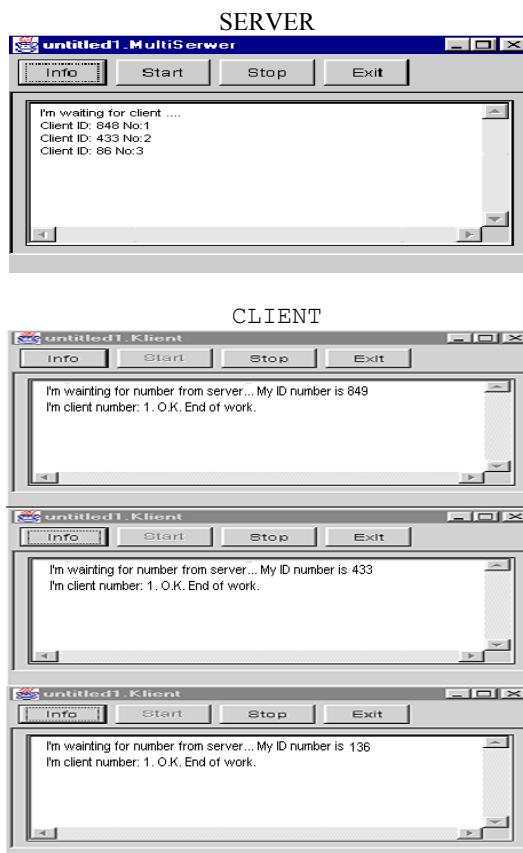


Fig. 6. Visualization of simulation based on multiserver's working system.

with taking of Internet advantages complete propositions shown on the fig.7 and fig.8. Fig.7 lets create the programs consisting of agent with simulate basic dynamic units. The dynamic units are

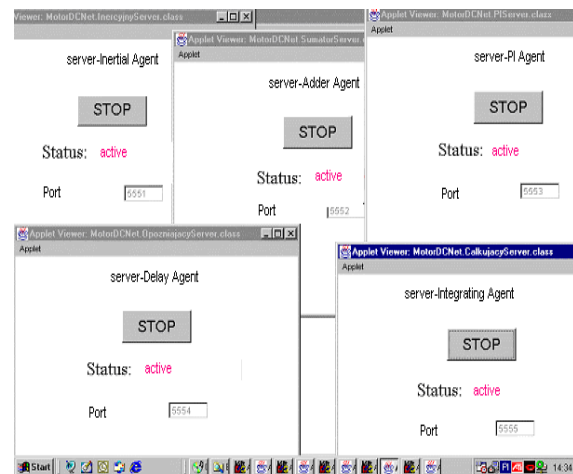


Fig.7 Active agents prepared for work on servers that simulate of typical control units.

located in separate servers. We became some control system if we appropriate connected these units. Fig.8 shows the complete control system on fig.1 which is simulated in computing net. These visualization permits the choose any address and any port of computer in net. On the screen we can set up the parameters of units fitted up in server.

VISUALIZATION OF RESULTS OF SIMULATED SYSTEM

Tool BDK give output only in numerical form. Result of presented form depends on programmer. In these situation output's forms depend on invention and ingeniousness of programmer.

The result can be presented directly on the screen which controls net (fig.8) or separate plots (fig.9).

On fig.9 have been shown results of using servers and RMI (Remote Method Invocation) to computing and simulating the direct speed control with the DC motor for different control systems. Thanks to these solution we can observe plots on the one screen for different motors.

Package PASION has very much possibility of presentation results of simulating calculates. It can present the results in numerical and graphic forms. The plots permits to preset many diagrams of speed in the same time both 2D plots (fig.10) and 3D plots (fig.11). We can observe 3D plots with different point of environment. PASION lets to present the state variables on the phase-plane (fig.12).

CONCLUSION

On the base carry out experiments regarding possibility visual creating programs and graphic elaborate result of simulation have been find out:

- thanks to visual method created the program we can leave out the difficult mathematical description,
- advantage of JavaBeans is the possibility of work in net, disadvantages are lack ready-made

dynamic units and a little suggestion visual create programs (for example in BDK),

- advantages of PASION package are ready-made dynamic units, analogue produce block diagram on the screen and very much possibilities graphic illustrate of output results; disadvantages is lack possibility net's programming,
- the propositions of visualization programs in computing net, its creating, handle ready-made programs and present output result fill to a certain degree a gap especially in parallel and distributed calculate.

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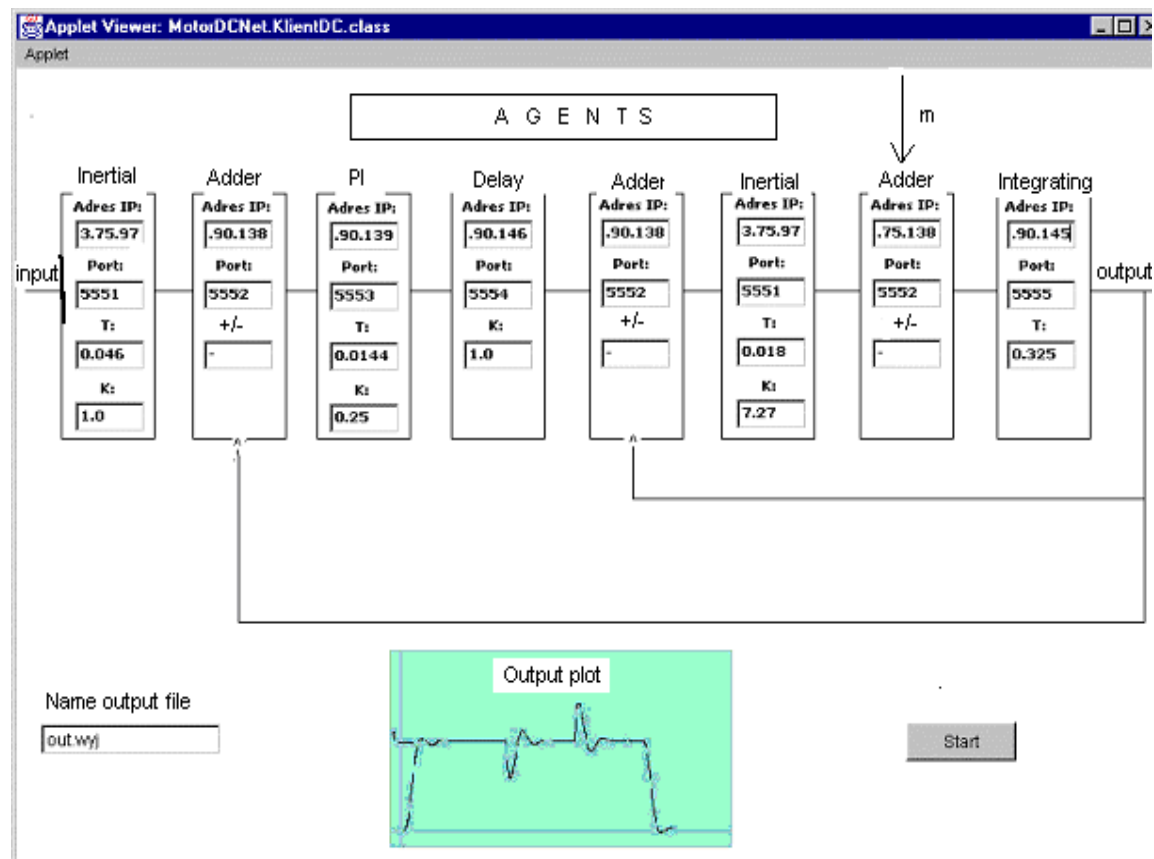


Fig.8. Control agent's screen that is the client of servers.

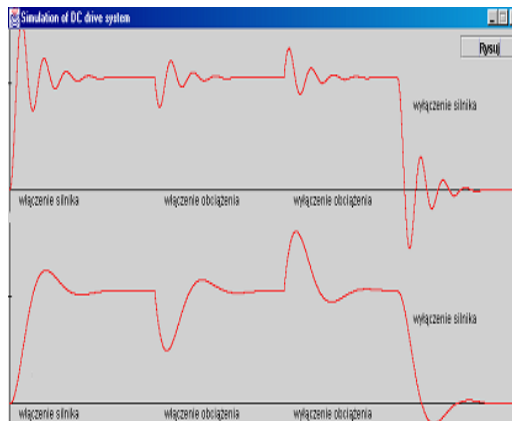


Fig.9 Diagrams of speed for the direct speed control with the DC motor.

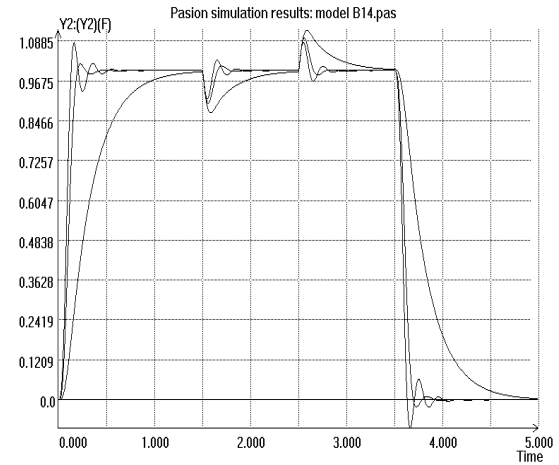


Fig.10. Diagram of speed for different parameters of control for different control system.

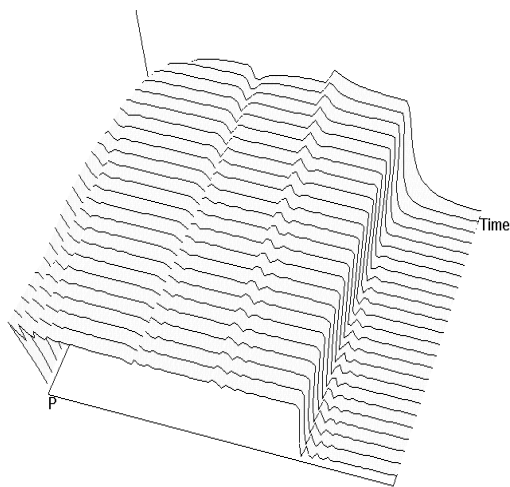


Fig.11 Diagrams of speed in 3D with the gain varying of controller.

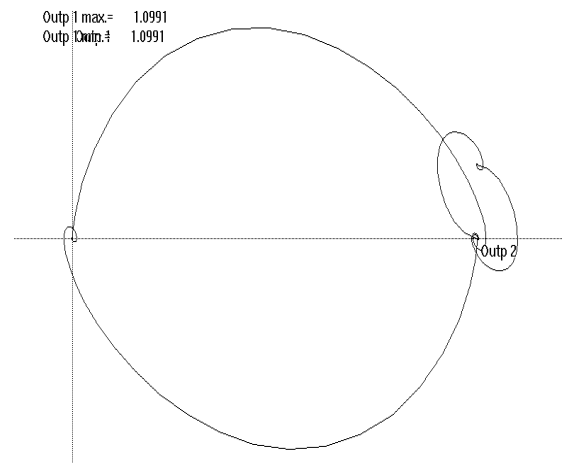


Fig.12 Oscillations of the speed and the armature's current on the phase plane.