

The Development of Conceptual Model of Creation of an Intelligent System

Application on Robotic systems

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Abstract — paper present the conceptual model of creation of robotic intelligent system. Nowadays, robotic systems are entering into different areas of human activity. Most of the tasks executed by robots are supervised by human. Every year researchers suggesting new model and methods to develop intelligent, flexible, and robust autonomous systems. A robotic system should recognize the environment and executes the tasks it is commanded to perform more ingenious tasks in more complicated environments. As robotic systems are complex system, and its integration is one of the most difficult tasks whereby sensors, vision systems, controllers, machine elements, and software for planning, supervision, and learning are tied together to give a functional entity. After dealing with functional entity, the system should have right intelligence level to interact with a dynamic world.

Keywords-intelligent systems; multiagent systems; planing; decision making processess; robots.

I. INTRODUCTION

As it is known complex systems are made up of a large number of simple systems, each of which may be easy to understand or to solve for. Together, however, they pose a formidable modeling and computational task [1]. Simple subsystems may be interconnected in the form of networks. These may be of different kinds depending on the form of the probability vs. number of links curve. For random and small-world networks [2] it is bell-shaped while for a scale-free network it is a power law [3] [4].

What is the intelligent or intellectual systems?

In our understanding the Intelligent system is a system in which has the right instruments to form an intellectual behavior, while taking into account different condition and circumstances that may accrue during the execution of the

behavior. Usually the system is trying to achieve the given goal/task and results in data domain which represents a part of an external environment and characterized by some set of conditions, knowledge, activity scenarios.

A robotic system and its control are termed intelligent if the system can self- determine its decision choices based upon the simulation of needed solutions or upon experience stored in the form of rules in its knowledge base. The required level of intelligence depends on how the complete its knowledge is about its environment. The different classes of intelligent robotic systems are shown in Figure 1[5].

Next section will describe problems that may accrue during the development of an intelligent system.

II. PROBLEMS OF DEVELOPMENT AN INTELLIGENT SYSTEMS

The general technology of creation of an intellectual system (IS) - the system possessing intelligence, - is based on development of following directions of creation of components of this system, fulfilling the separate processes providing functioning of the system as an integral part.

As per the problems connected to development of intellectual technologies and demanding the prime solution is as follows:

- the first group of problems is defined as a choice of the form of information representation which uses the IS,
- the second group is problems of a choice of adequate mechanisms of the information transforms corresponding to concepts, relations and properties of data domain,
- the third group of problems is problems of uncertainty of the information. This class of problems is connected to incompleteness and inaccuracy of a language in which the

person represents the knowledge and facts connected to knowledge [6].

As refer to robots, intelligent (integrated) robots called third-generation automatic devices that must operate in a dynamic closed world have a tactile and visual perception of the environment, are mobile, able to change the layout. In addition, intelligent robot control system should function based on the modeling of the external world, the choice of solving the problem on the basis of the task and the dynamic changes in the outside world.

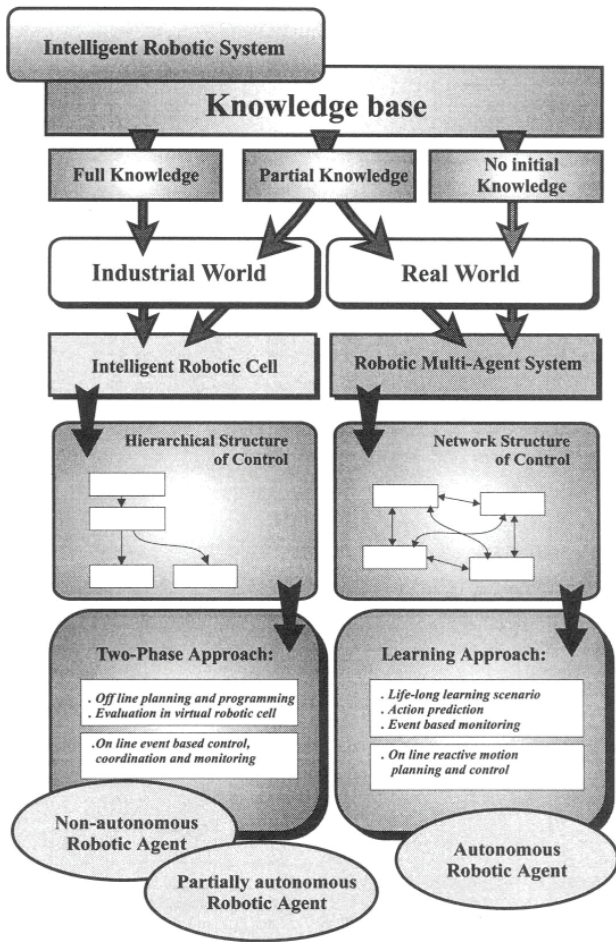


Figure 1. Intelligent robotic systems: Classes, structures, and methods[5].

Intelligent robot systems planning at its core is based on the development of intelligent robots. Building intelligent robots theory provides a resolution of two issues:

- 1) a description of the robot solver, its knowledge and activity;
- 2) construction of the theory of intelligent solutions.

The decision intellectual tasks currently remain the prerogative of man. It is obvious that a person uses in solving some internal language representation of the knowledge that allows him to simplify the model of inner peace and carry out an effective search of necessary decisions in close relationship

with adequately described by the model of the external world. Thus, when constructing robot solver must describe not only the model solver, but also a model of human functioning in the decision process.

Description of the planning system is, first of all, a description of patterns of mental activity of such a system for solving complex practical problems. This should include awareness of system planning processes of the external world situations and actions performed, as well as search processes of the solutions. Thus, the description of the planning system, its knowledge and activities should include the following: [7]

- 1) a description of the executive bodies of the solver;
- 2) a description of the environment;
- 3) a description of the knowledge system of planning, reflecting the understanding of the activities of the executive bodies and the environment solver;
- 4) a description of the search process solutions proposed objectives.

To solve the listed problems, it is necessary to create the model, which will consider all requirements. In the next section we proposed the conceptual model of an intelligent system of decision making.

III. PROPOSED CONCEPTUAL MODEL

Main tasks in intelligent systems usually divided into small subtasks, which execution lead to the final goal. In Figure 2. One can see the traditional decision making process in intelligent systems. After the input data (in other words any knowledge, conditions) is given, the decision making system will choose the right point that it thinks that optimal at very time. Thus, affects to the to next subtask's decision point. So each following point already caused from the previous design point. The drawbacks of this kind of systems is it is not taking into account that there might be external factors, that can cause changes, while considering the decision point. We proposed the new system(Figure 3), that can consider not only the input data, but the unpredictable, external factors that can change whole process of execution of tasks.

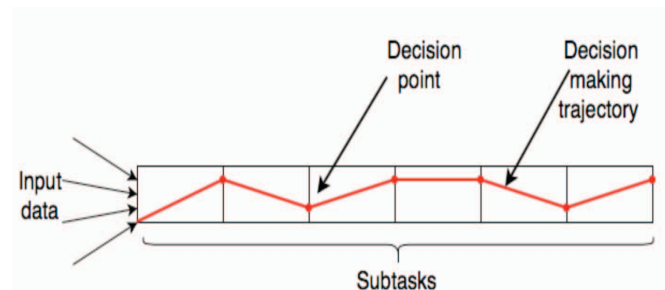


Figure 2. Traditional decision making process

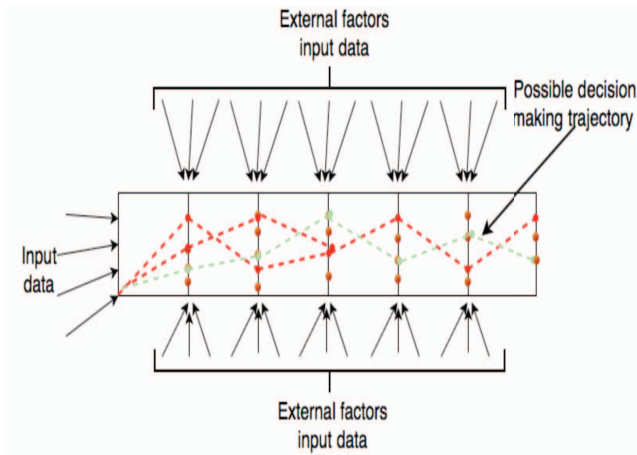


Figure 3. Conceptual model of new design making system

IV. CONCLUSION AND FUTURE WORK

In the age of modern information technology, many applications can be modeled as a intelligent system, especially multiagent systems in which people, and autonomous objects can dynamically collaborate to achieve their goals [8], [9], [10], [11], [12]. Organizations of robots should be adapted to the environment and to the tasks given to them to meet performance requirements. Consequently, it may be necessary to optimize the organization of MAS and decision making process in them. In general, the optimization of the design organization of decision making process in MAS remains active area of research, with a large number of works devoted to the optimization of a single form of organization and the overall methodology, which serves as a guide for the development of the organization MAS [13]. Paper presented the conceptual model of intelligent system for decision making process, taking into account all the input and mid-input information, which can provide better, optimized decision which is right at very moment. In future it is planned to formalize the suggested model.

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