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COMPUTER AIDED EDUCATION IN AREA OF AUTOMATIC CONTROL: CAAC INFORMATION SYSTEM

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Abstract: This paper is deals with a presentation of the CAAC (Computer Aided Automatic Control) information system. The CAAC information system has been arranged for the time being into 15 problem areas, the so called subsystems which include the automatic control theory. In all subsystems, the so-called "problem specification" is formulated by means of tree structure. The tree structure serves as a basis for the creation of structure of given subsystem on webpages. In this paper is shown the CAAC information system tree structure of concrete subsystem - analysis. The use of the CAAC information system is anticipated especially in pedagogical processes in area of automatic control.
Key words: automatic control, dynamic webpages, education, Internet

1. INTRODUCTION

When solving the particular design of automatic control of the technological process, it is necessary to use some of the methods of analysis of controlled systems, or their identification, synthesis of control loops, solution of robustness of the designed control systems, or adaptive algorithms, design of optimum algorithms for control, simulation of behaviour of the controlled system, including control processes, or predication of time series and predictive control, with an aim at improving quality of the course of the control processes, simultaneously providing safety at technological processes, their economy and influence on the environment. The described CAAC information system represents a continuously created information system of partial problem areas which include the automatic control (Navrátil, 2004). This information system is a certain form of eLearning.

2. CAAC INFORMATION SYSTEM

2.1 Conception of the CAAC information system

The CAAC information system structure is open, with a possibility to formulate further problem areas in the area automatic control. The CAAC information system has been arranged for the time being into 15 subsystems (see Fig. 1) (Navrátil, 2004).
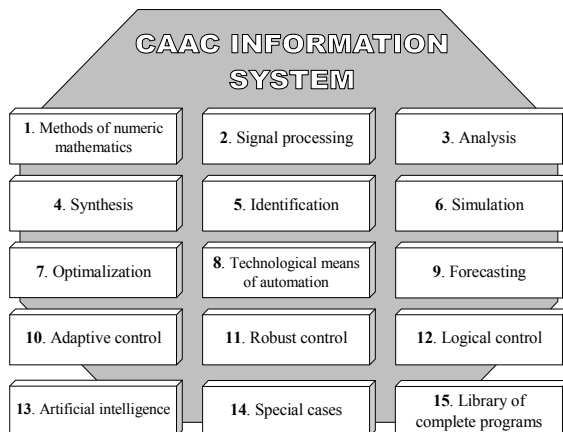

Fig. 1. Problem areas of the CAAC information system

2.2 Structure of the CAAC information system

In all subsystems, the so-called "problem specification" is formulated. Each subsystem is split up into the modules, which are further split up into the sub-modules up into the basic sub-modules, which is the lowest level of hierarchic arrangement of the CAAC information system (see Fig. 3). The basic sub-module solves the concrete problem (e.g. system stability according to the Lyapunov theory) of the given subsystem (e.g. Analysis) and should include description of solving of the problem, example, references and computer program. An exception is the subsystem „Library of complete programs", where the basic sub-module should include a computer program created for a chosen parts of the concrete subsystem or subsystems and also description of this program (Navrátil, 2004).
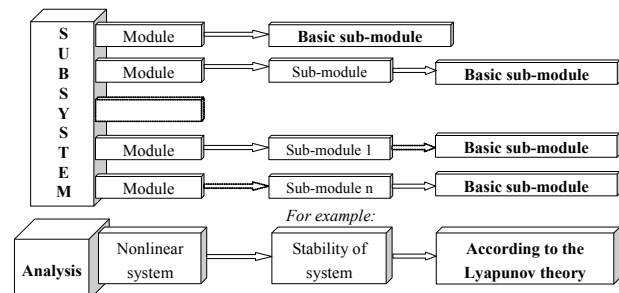

Fig. 2. Structure of the CAAC information system

2.3 Tree structures of subsystems of the CAAC information system

Tree structure of a chosen CAAC information system subsystem is shown as an example in Fig. 3. You can also find other examples of structures in (Navrátil, 2004).
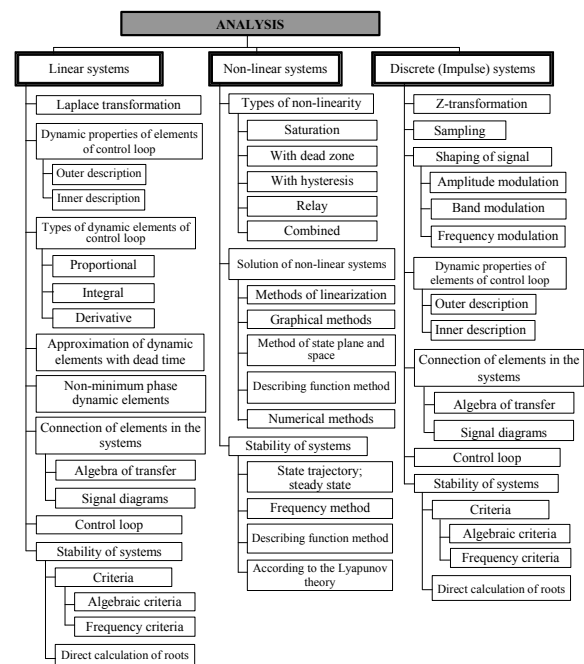

Fig. 3. Tree structure of analysis subsystem

3. CAAC INFORMATION SYSTEM ON WEBPAGES

The CAAC information system is very extensive it consists of a large quantity of the individual basic sub-modules which determine due to their contents the quality of the whole CAAC information system. Therefore it was very important to determine such claims in order that it may be possible to complete the CAAC information system with the new basic sub-modules, or as the case may arise, to modify the existing basic sub-modules easily and quickly.

Therefore the following claims are posed on the CAAC information system on WWW pages:
- hierarchical arrangement and intuitive names of individual directories and files
- unambiguous structure of a particular webpages of the CAAC information system
- safety at updating and adding of individual parts of this information system
- fast searching of files for their updating

One of possible approaches is the creation of the directories structures and a proposal of the files location in the CAAC information system, the creation of the contents of webpages for individual parts of CAAC information system and the creation of the information lists about the present state of the particular parts of the CAAC information system solution (Navrátil, 2004). To creation of the CAAC information system have used possibilities of PHP language, structured query language (SQL), HTML and cascade style sheets (CSS) (Veselý, 2006).

3.1 Structure of directories and files location in the CAAC information system

For correct and safe adjustment or replacement of one of the files of the CAAC information system, it is necessary to keep a certain location and names of the directories and files. Therefore, they were created 3 types of the directories structures and proposed the files location in these directories. These 3 types cover the whole problem of layout of directories and files in the CAAC information system on webpages. The first structure deals with the most fundamental arrangement of the directories and files in the CAAC information system. The other two structures refer to location of the files inside individual subsystems of the CAAC information system.

3.2 Contents of webpages

Each contents of webpage includes a certain part of the structure of the CAAC information system, which was shown in Fig. 3, where each subsystem is split up into the modules, which are further split up into the sub-modules up into the basic sub-modules. There have been created 3 contents of webpages, i.e. contents of webpages of the subsystem, contents of the information webpage of the subsystem "Library of complete programs" and contents of webpage of the basic sub-module.

3.3 Information lists about the situation of the particular parts of the CAAC information system solution

For better orientation in items of information on status of individual solved parts of the CAAC information system, it was necessary to create a structure of lists of this information system. With help of these lists it could be better to search for information on actual status of particular problems, and on the basis of information gained like this, modifications in this information system might be done. Two principal types of the information lists have been created. The first type of the list will comprise information on basic sub-modules of the particular subsystem. This list will be used for subsystems 1 to 14. For subsystem 15, i.e. the subsystem „Library of complete programs", the second type of the list has been created, as not so much information is required for this one.

4. USAGE

The use of the CAAC information system is anticipated mainly for didactic purposes whereas utilisation of webpages on the Internet is supposed. Concrete problems of given problem areas - subsystems 1-14 (see Fig. 1) will be described in basic sub-modules in detail.

The finished programs that will solve problems in the given problem area or areas will be loaded in subsystem 15 - "Library of complete programs" (see Fig. 1). Last figure (see Fig. 4) shows the way of loading of information into the CAAC information system. The solved task will pass through the evaluation on basis of which the solved task will be recommended or not recommended to be included into the CAAC information system. In case of positive assessment of the solved task, this will be made available to the users by means of the service of webpages. The users will be able to give their comments, based on their experience, to the solution through the author (Navrátil, 2004).
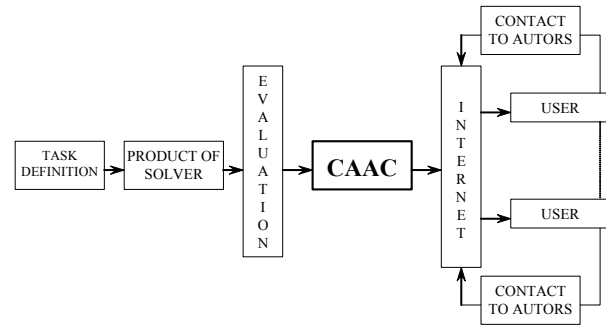

Fig. 4. Information flows in the CAAC information system

Other electronic utilities for didactic purposes in area of the automatic control theory have been created especially at universities, i.e. TU in Ostrava, TU in Liberec, etc. (Wagnerová & Minár, 2000), (Wagnerová & Minář, 2000), (Vítečková, 1999), (Linka, 2007).

5. PRESENT SITUATION

At present, the CAAC information system has on webpages partially loaded the subsystems "Analysis", "Synthesis", "Logic control" and „Library of complete programs", i.e. in the subsystem "Analysis" there are 10 basic sub-modules, in the subsystem "Synthesis" 20 basic sub-modules and in the subsystem "Logic control" 10 basic sub-modules. The subsystem "Library of complete programs" comprises 6 finished programs. At present time, chosen webpages are accessible on the Internet (***http://www.caac.zde.cz***). For the time being, these webpages have been created in the Czech language.

6. CONCLUSION

The aim of this paper was to demonstrate one of the possible approaches to education realization for the area of automatic control by utilization of webpages on the Internet. The CAAC information system is proposed as a tool for realization of an electronic support of education that is called eLearning.

7. REFERENCES

Linka, A. (2007). *TUL E-learning system*, *Available from*: http://e-learning.vslib.cz *Accessed:* 2007-05-02 (in Czech)

Navrátil P. (2004). *CAAC information system - Computer aided automatic control* (Dissertation), TBU in Zlin, Czech Republic. (in Czech)

Veselý, L. (2006). Usage of the modern tools to modification of CAAC information system on webpages (Bachelor's work), TBU in Zlín.

Vítečková, M. (1999). *The mathematic methods used in the area automatization and control*, *Available from*: http://www.fs.vsb.cz/books/matmet/ATR.htm *Accessed:* 1999-06-18 (in Czech)

Wagnerová, R. & Minár, K. (2000). Tutorial for the analysis of control loop, *Available from*: http://www.fs.vsb.cz/books/Analyza/Index.htm *Accessed:* 2000-07-21 (in Czech)

Wagnerová, R. & Minář, M. (2000). Control loop synthesis, *Available from*: http://www.fs.vsb.cz/fakulta/kat/352/uc_texty/Synteza/ index.htm *Accessed:* 2000-08-22 (in Czech)