11th International Research/Expert Conference
"Trends in the Development of Machinery and Associated Technology"
TMT 2007, Hammamet, Tunisia, 05-09 September, 2007.

ONE OF POSSIBLE APPROACH TO SOLUTION OF COMPUTER AIDED EDUCATION FOR AREA OF AUTOMATIC CONTROL

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ABSTRACT
This paper describes one of possible approach to solution of computer aided education for area of automatic control with utilisation of webpages. The paper deals with a representation of the CAAC (Computer Aided Automatic Control) information system. This information system has a modular structure and it is open so that it is possible to add and eventually modify particular parts of the CAAC information system easy according to personal requirements and pre-defined rules. This information system has been arranged for the time being into 15 problem areas, the so called subsystems which include the theory of automatic control. In all these subsystems, the so-called "problem specification" is formulated via the tree structure. The tree structure serves as a basis for the creation of structure of given subsystem on webpages. The use of the CAAC information system is anticipated especially in pedagogical processes in area of automatic control.
Keywords: automatic control, education, Internet, webpages

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, eventually an other methods, 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 theory [1], [3], [4]. This information system should presents a certain form of eLearning, which has been discussed a great deal and promoted recently.

2. CAAC MODULAR 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 theory. The CAAC information system has been arranged for the time being into 15 subsystems, so called problem areas (see Figure 1).

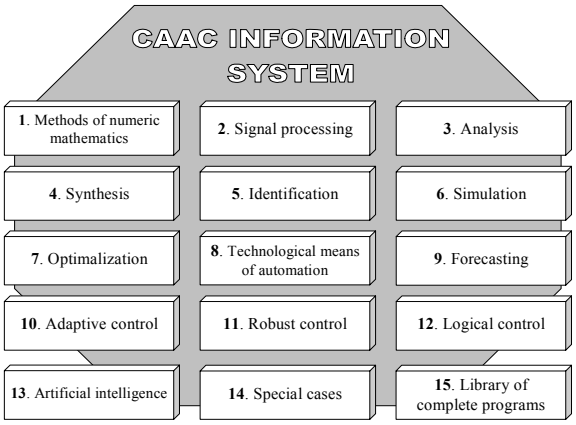

Figure 1. Subsystems of the CAAC information system

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 Figure 2). The basic sub-module solves the concrete problem of the given subsystem and should include expert description, 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 [3].

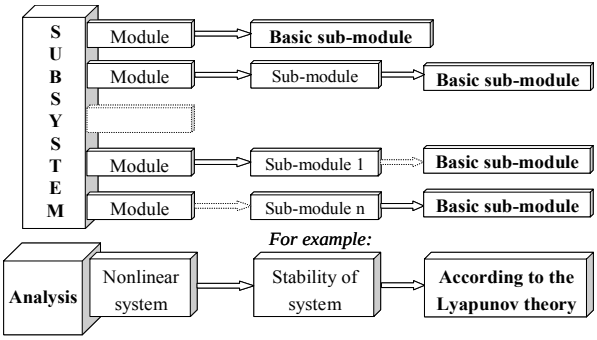

Figure 2. Structure of the CAAC information system

2.3. Tree structures of subsystems of the CAAC information system

Tree structures of all subsystems serve as a basis for the creation of webpages. They correspond to the structure that is shown in Figure 2. The tree structure of a chosen CAAC information system subsystem is shown as an example in **Error! Reference source not found.**. Other examples of tree structures are possible to find in [3].

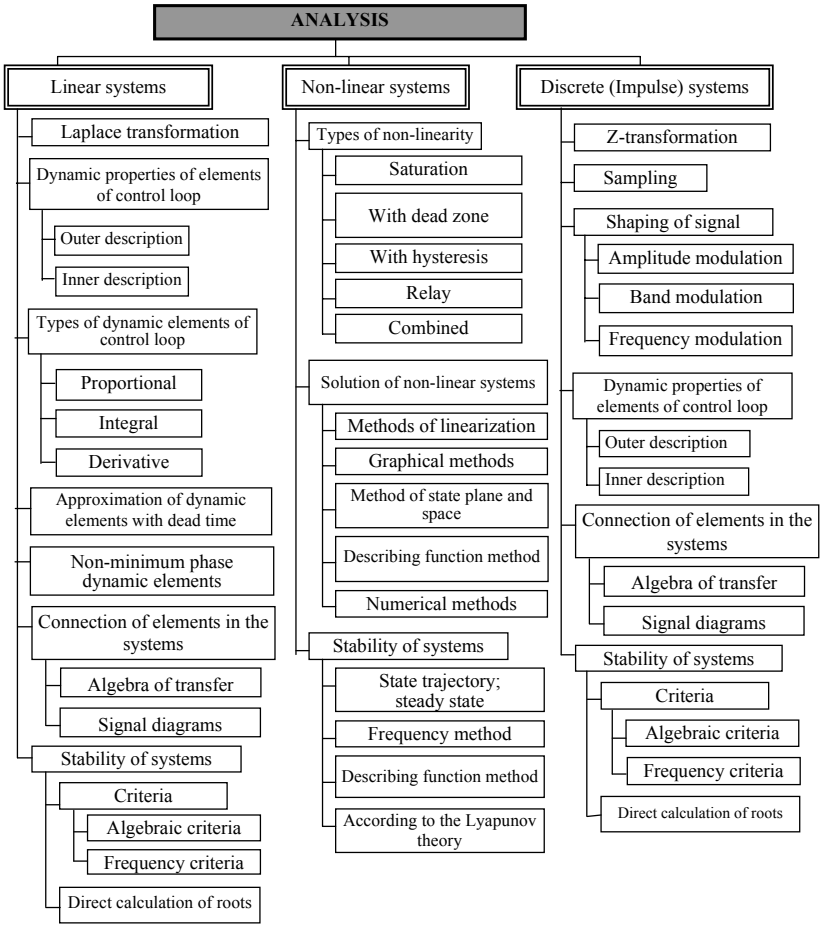

Figure 3. Tree structure of analysis subsystem

3. CAAC INFORMATION SYSTEM ON WEBPAGES

The CAAC information system consists of a large quantity of the individual sub-modules which determine due to their contents the quality of the whole CAAC information system. Therefore it is very important to become aware of the extent of the whole information system in order that it may be

possible to complete it with the new basic sub-modules, or as the case may arise, to modify the existing ones.
Therefore the following claims are posed on the CAAC information system on webpages:

- 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 the CAAC 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 the CAAC information system and the creation of the information lists about the present state of the particular parts of the CAAC information system solution [3].
To creation and other modifications of the CAAC information system have used possibilities of PHP language, structured query language (SQL), HTML and cascade style sheets (CSS) [4].

3.1. Directories structure 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 Figure 2., 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]. For easier structure of the HTML file, the so-called cascade style sheets (CSS) have been used. Advantages of using the cascade style sheets in HTML files are similar as with usage of style sheets in the WORD or levels in the AutoCAD.

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 OF THE CAAC INFORMATION SYSTEM

Usage of the CAAC information system is anticipated mainly for didactic purposes. Help in usage of the CAAC information system for didactic purposes may be useful in these days in utilisation of webpages on the Internet where elements of individual problem areas – subsystems 1-14 (see Figure 1) will be described in basic submodules 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 Figure 1). Last figure (see **Error! Reference source not found.**) 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 [3].

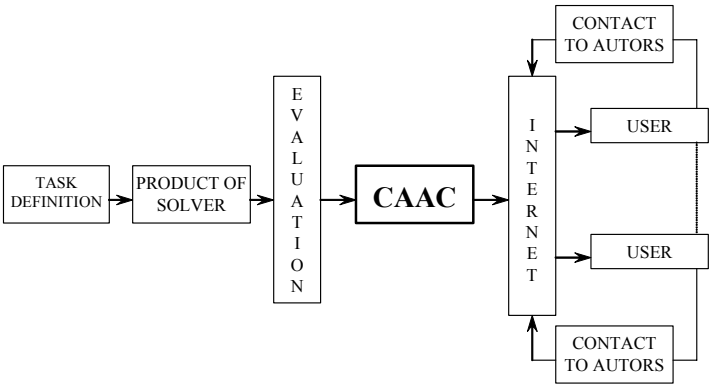

Figure 4. Information flows in the CAAC information system

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. [2], [5], [6], [7].

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 7 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 solution of computer aided education for area of automatic control by utilization of webpages. The described CAAC information system is proposed as a tool for realization of an electronic support of education that is called eLearning.

7. ACKNOWLEDGMENTS

This work was supported in part by the Grant agency of Czech Republic under grant No: 101/06/0920 and in part by the Ministry of Education of the Czech Republic under grant No. MSM 7088352102.

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