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AUTOMATED CONTROL SYSTEMS

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**MODELING - 2008:
THE NEW BRIDGE BETWEEN THE SCIENCE AND MANUFACTURE**

Reisig Wolfgang, Surguladze Gia, Gulua David

Humboldt University Berlin (Germany)

Summary

Detailed review of the scientific conference «Modeling-2008 » in which participate Universities of Germany and the representatives of famous companies working in the field of information technologies (IT) is offered. The organizer of the conference was the Society of computer science (24500 members) of Germany and it was held at the Humboldt University Berlin, on the basis of department « Theory of programming » (Head of Dept. Prof.Dr. W. Reisig - the theoretical head of conference). The basic direction of computer science - modeling has been precisely established on various sessions and workshops of the conference. The basic tendencies of its further development and practical use are certain. Here those scientific achievements and new tool means which are more effective are briefly analyzed and are perspective in the field of modeling, manufacture and business-processes. There are briefly analyzed those scientific achievements and new means of the tools which are more effective and perspective in the sphere of modeling of processes of production and business.

SCENARIOS IN DISTRIBUTED AND REACTIVE SYSTEMS

Reisig Wolfgang

Humboldt University of Berlin

Summary

Scenarios are widely used tools for designing and analysis of reactive and distributed systems. From technical point of view, design of scenarios must be elaborated by means of finite, distributed processes. Every distributed process of System consists of several scenarios and understanding nature of scenarios is often the best way for understanding whole system. In this paper we consider these items by using examples of Mutual Exclusion, Crosstalk and Cakes Automat.

**ON APPLICATION OF STATISTICAL PROCESS CONTROL
TO SOFTWARE ENGINEERING**

Chakhunashvili Alexander

Skaraborg Hospital Group, Skövde, Sweden

Summary

While statistical methods for quality improvement have found broad application in traditional production industries (e.g. automotive, electronics, chemical and food-processing industries), their use in the software engineering field have been rather limited. There are, however, examples showing that the statistical quality improvement methods can equally well be applied to software engineering, or alternatively to larger IT application development. In this paper we review one important area of statistical quality improvement; namely, Statistical Process Control (SPC) and discuss its application in the software engineering context.

RANDOM SEQUENCE RECOGNITION BASED ON SAMPLING DISTRIBUTIONS

Kvitashvili Avtandil

International Black Sea University, Tbilissi

Abstract

We considered small and large sample cases, or $n < 30$ or $n \geq 30$, where samples are presented as sequences of random numbers or vectors. Each vector of random components is transformed into one number – the mean of random components. Then the sampling distribution is constructed for the classes of sequences using these means of vector components with a corresponding confidence interval. If confidence intervals of classes are overlapped, or classes are not separable, that practically does not happen in most cases, it is the subject of other consideration. Such confidence spaces are constructed for two or more classes using the training sequences. Then the distance between each pairs of sampling distribution means or centers are determined that defines a real confidence level or recognition accuracy. Afterwards, any new unknown coming sequence or vector is classified depending on to which class subspace it falls in, that in general case presents a hyper-ellipsoid.

**MATHEMATICAL MODELING OF INTELLECT DYNAMICS
OF THE INDIVIDUAL. FRACTAL STRUCTURE OF THE PSYCHE**

Obgadze Tamaz, Nersesov George
Georgian Technical University

Summary

This article presents well-known testological approach of Thurstone - Guilford - Meili and ethological approach of Charlesworth - Piaget. Between tests, used by Thurstone, positive correlations are typically observed. Second-order factor analysis shows the possibility of the implementation of a generalized factor, similar Spirmenovskiy's factor g. Analysis of the many works on psychology of intelligence shows that, despite the different concepts and approaches, the general theory of intelligence does not explain various aspects of intelligence, as part of a whole, do not have a common line of development of intelligence level and development of the intellect structure at various levels of evolution. To fill these gaps, abide by Obgadze T.A. introduces the concept of intelligence index, which builds a mathematical model and searches out the right solution for the dynamics of the index. In the study of dynamics of the intelligence index for various lengths of time scale, it examines the changes in the structure of intelligence index over time. The received identiti of animalitical dependence of an index from age, at different time scales, speaks about self-similarity that is characteristic for structre fractal sets. starting point for each time scale - is the individual's star date of birth.

**EXPERIMENTAL ESTIMATION OF EFFICIENCY
OF GLOBAL OPTIMIZATION METHODS**

Jibladze Nodar, Imedadze Teimuraz, Gachechiladze Lela
Georgian Technical University

Summary

Methods of global optimization are considered: a method of Ψ -transformation, a method of the centers of gravity and the various combined methods of search of an extremum. For an estimation of their efficiency computational experiments on test functions are carried out and the received results are analyzed. On the basis of the comparative analysis the preference is given to a method of the centers of gravity which with satisfactory accuracy and the minimal losses on search provides solving for the global optimum.

**OPTIMUM CONTROL OF THE OBJECT WITH TWO INTEGRATORS
(TRANSITION OF THE SYSTEM FROM ANY INITIAL STATE TO
THE ORIGIN OF COORDINATES)**

Mchedlishvili Nino, Mosashvili Irine
Georgian Technical University

Summary

The problem of optimum control of inertial object with double integration is considered. For the solution of this problem optimum control is determined, motion trajectories are plotted on phase plane, law of control is found and structural diagram of its realization is drawn. The object is described with the second order differential equation. The function of transmission is given. Control is limited. The allowable control is determined which transfers the system from any initial state to the origin of coordinates in possible minimum time. In order to plot motion trajectories on phase plane the trajectory equations are solved with initial conditions taken into account. These trajectories represent parabolas. The work presents phase trajectories received with Matlab system and the corresponding program. The switch curve for objects with double integrations is obtained. The realization of the law of control is done by creation of nonlinear system (feedback) of control which transforms phase coordinates and establishes optimum control. Phase coordinates change in every moment of time. The scheme of optimum control system realization relative to quick action is drawn, its modelling also realized by means of Matlab system and its expansion Simulink. Phase trajectory is plotted with the given initial conditions. The initial conditions are changed and the respective phase trajectories are introduced into the same graphical window. As a result a very interesting phase portrait is obtained. Thus, when designing optimum control systems it is much simpler and more effective to use modern computer technologies in order to get precise results.

**PRODUCTIVITY OF THE TWO-MACHINE COMPUTING SYSTEM OF
PARALLEL TYPE IN THE VIEW OF RELIABILITY**

Mikadze Ilia, Mikiashvili Nana
Georgian Technical University

Summary

The present work deals with probability characteristics of output of calculating system of parallel type, taking into account reliability of two identical, independent calculating mashines. It is implied that capacity of calculating which is necessary to solve a task is an accidental value. The likelihood characteristics of task executed by parallel system during the given time are founded in this article. They are written down by Laplace-Ctiltes transformation, and as a result of this we determine likelihood and numerical characteristics.

**PERFORMANCE OF TASKS BY MEANS OF THE COMPUTER
WITH NOT LOADED RESERVE**

Mikiashvili Nana

Georgian Technical University

Summary

The likelihood characteristics of task executed by unreserved system during the given time are obtained in this article. They are written down by Laplace-Stiltes transformation, and according to them it is possible to get numerical characteristic of accidental time of task execution, such as population mean, dispersion and so on.

**DEFINITION OF PARAMETERS OF RELIABILITY, WHEN THE STREAM OF REFUSALS
IS DISTRIBUTED CONSISTENTLY IN PARALLEL ON MIX OF ERLANG**

Andjaparidze Tristan, Mikadze Ilia Z., Museridze Nodar, Shurgaia Irakli

Georgian Technical University

Summary

The question of definition of reliability of such devices which are characterized by two kinds of refusals gradual (deterioration) and catastrophic (sudden) is considered. Gradual refusal is distributed by mix of Erlang, and sudden - indicative. The basic parameters of reliability, such as function of readiness and factor of readiness are certain.

MODERN PRINCIPLES AND MEANS OF BUSINESS-PROCESSES MODELING

Surguladze Gia, Turkia Ekaterine, Giutashvili Megi

Georgian Technical University

Summary

In this article the modern principles and means of business-processes modeling on the basis of the notation of business-processes modeling are considered. Its purpose is the creation of an uniform information technological infrastructure and standardization of graphic elements of modeling to construct and design the business-structures. The offered concept assists an assessment business-operations, as well as continuous and stage-by-stage optimization of business, integration of the structured and not structured data and their further analysis, monitoring of systems, visualization and versionsof the processes management and procedures.

**METHOD OF APPROXIMATION OF A CURVE "A HUMIDITY - OPTICAL
PARAMETER" AND THE ALGORITHM OF DEFINITION OF CALIBRATING
CHARACTERISTICS**

Nozadze Tsiuri, Gori University,
Samkharadze Roman, Georgian Technical University

Summary

The questions of information - methodological support of the problem-oriented computer complex for the automated technology experimental research for infra-red measurement of humidity are considered. The offered method reduces an error called by an error of approximation by curve "humidity - optical parameter". An error of approximation is caused by complexity of preparation and test of a plenty of samples of a material. The method of definition constant "a, k, b" of logarithmic function of definition of humidity, by means of three samples appropriate to the minimal, maximal and average importance of the given range of measurement is offered.

**SIMULATING OF CHANGES OF THE CONDITIONS OF THE PROCESSES
ON THE BASIS OF A PETRI NETWORK**

Samkharadze Roman, **Gvaramia Eka**, **Gachechiladze Lia**
Georgian Technical University

Summary

In the article the new approach to visualisation of the process changes is presented. For this purpose the VN - network, the Petri's network machine is used. On its base the model of visualising process changes is used.

PROGRAM GROUP OF INFORMATION GENERATION IN XLS FORMAT

Kartvelishvili Ioseb, **Kumelashvili Natia**
Georgian Technical University

Summary

The Work describes the program group to generatie the information into XLS format. There are presented basic and generated classes, constructors, procedures and functions. The program codes are worked out for the algorithm of each method. Program codes are represented schematically and the functions of each are described.

ALGORITHM FOR NORMALIZATION OF HAND-WRITTEN SYMBOLS

Kartvelishvili Ioseb

Georgian Technical University

Summary

The thesis presents the algorithm for normalization of hand-written symbols. The algorithm is designed in algorithmic blocks. Each block carries out the function of automatic identification. The function of each algorithmic block is described.

**ALGORITHM OF SYSTEM CALCULATION OF INFORMATION-MANAGEMENT
ROBOTS**

Gabedava Omar, Pochovian Simon, Kekelia Valeri

Georgian Technical University

Summary

In the work is considered apparatus-programmed realization of information-management robots, by means of the using contemporary hybrid calculative techniques we get the rise of effectiveness of working system and property expenses decreasing on the calculation.

**MODEL OF MANAGEMENT OF MANIPULATORS IN THE FORM OF
MODIFIED NETWORK PETRI**

Gabedava Omar, Pochovjan Simon

Georgian Technical University

Summary

Here is presented the description of a problem of automated management by manipulators with technical sight. The block diagram of the object of management and the model of managerial process in the form of modified network Petri is resulted.

**ABOUT ONE IMPLEMENTATION OF OLAP-CONCEPTION IN
INFORMATION SYSTEMS OF SUPPORT OF DECISION-MAKING**

Petriashvili Lily, Vacharadze Irina, Basiladze George

Georgian Technical University

Summary

The question of use of the OLAP-tool for the operative analysis of business-processes is considered. The user interface is developed to display the information from the distributed, relational DB in the form of a multivariate cube and the structured organization of this information in uniform system of support of decision-making. Program realization of an applied package of system on the basis of components DECISION CUBE of object-oriented programming C++ for a problem of the multifactorial analysis is offered.

**UML AND SIMULATION OF INFORMATION-TECHNOLOGICAL
PROCESSES OF PRODUCTION**

Okhanashvili Maia, Sharashidze Tornike

Georgian Technical University

Summary

The question of research of information-technological processes of production from the point of view of the system analysis and marketing maintenance of the enterprise is considered. The concept of construction of the integrated Management information system on the basis of UML and client-server architecture is offered. The example of construction of simulation of the process of production is stated. The optimum number of resources of process of manufacture from the maximal profit is certain.

DEVELOPMENT OF MULTIMEDIA SYSTEM' MODEL

Tevdoradze Medea

Georgian Technical University

Summary

The question of estimation of multimedia system "Video on demand" is considered in the given article. In particular, the simple model of multimedia system is offered which enables to estimate such parameters, as optimum amount of clients, optimum loading of system, and to determine the processor of a server with optimal parameters.

**TO THE QUESTION OF DESIGN OF COMPUTER NETWORKS FOR
THE TELEMEDICINE**

Kamkamidze Konstantin, Manukov Mikhail,

Tevdoradze Medea, Saldadze Merab

Georgian Technical University

Summary

In the given article questions and problems connected with design of networks of a telemedicine are considered. The place and the role of a videoconference in a telemedicine is considered. The structure of distributed system which provides connection of clients of a local (corporate) network to a videoconference is offered, also the connection to a networks with switching channels (digital and analog telephone systems) and switching of packages (Internet) is provided. The basic and special hardware maintenance of a network, like is a server, a codec, a gatekeeper is described. Problems of a videoconference' network, such as coding and decoding of video - information, management of streams in a network are resulted, and ways of the decision of the specified problems are offered. In particular the algorithm of planning of processes of server' work is offered, two main organizations of file system (with blocks of the small size and with large blocks) are resulted, the organization of disk system and buffering which can be used for data transmission to a network and for reception of the data from network is offered.

DEVELOPMENT OF A METHOD OF SYNTHESIS OF ASYNCHRONOUS ACCUMULATING DIGITAL DEVICES BASED ON THE ADVANCED SELECTED TRIGGER

Benashvili Alexander, Imnaishvili Levan, Svanidze Nana

Georgian Technical University

Summary

The article proposes the method of the synthesis of asynchronous devices. The input variables for these devices are the facts of change of input signals and not potential signals. The theory of Boolean differential notation is used for the mathematical description of the fact of change of input variables.

The using of the proposed method completely formalizes the process of synthesis of asynchronous accumulating digital devices based on the advanced selected trigger. This is illustrated on the example of the asynchronous accumulating adder.

OPTIMAL METHODS OF DISTRIBUTION IN NETWORK SYSTEMS AT HIGH INTENSITY DATA STREAM

Natroshvili Otar, Choshtaria Cisana, Natroshvili Nino, Choshtaria Simon

Georgian Technical University

Summary

Processed by high intensity client-server data, methods of optimal packet distribution at output interfaces of switching nodes in computer networks at overflows.

VIBRATING DIAGNOSTICS OF PARAMETERS OF QUALITY AT THE OPERATION PHASE OF ELECTRIC MOTORS

Abelashvili Nodar

Georgian Technical University

Summary

At an operation phase, a cycle of production life, definition of parameters of quality and the more so diagnostic of defect is the major problem of quality assurance of production. The design of vibro-measurement device with accelerometer converter signal which contains the important information on a technical condition of object is offered. Processing of the results of experimental research by a method one-factorial disperse analysis has proved to have effective influence on factor in a target signal.

INFORMATION COLLECTION ISSUES FROM ENERGY SOURCES

Modebadze Iuri, Murjikneli Guram
Georgian Technical University

Summary

Necessary Information Collection and integration for energy system management is discussed in this article. Information processing, storing and digital stream formation are also covered. Corresponding structural schemes are given with application explanation. It is recommended, that digital stream should be formed according to the energy system functional peculiarities.

**DESIGNING OF AIS FOR “MUSEUM” ON THE BASIS OF THE
OBJECT-ORIENTED APPROACH**

Gogichaishvili George, Kenia Revaz
Georgian Technical University

Summary

The article deals with the automatic information system aimed at the arrangement of the informational space in the museums. The system will be provided with diverse options and wide coverage zone. The system implies management of the everyday activities in the museum, as well as quick and easy search of the information for users both in Georgia and abroad, for instance, museum staff, scholars, students, etc. The system will be designed using UML technology.

LINGUISTIC PROCESSORS: THE SURVEY ANALYSIS

Meparishvili Badri¹, Meparishvili Tamar², Janelidze Gulnara¹
1. Georgian Technical University,
2. Tbilisi State University, Georgia

Summary

This paper is concentrated to the new ways of development of the linguistic processors, and to the comparative analysis of the modern knowledge representation based on the ontology, HTML technology and XML technology. The description of the fonctionnement of the human brain from the viewpoint of the shape recognition, of the treatment of texts. The semantic hypergraph as a new approach of the solution of represented problems is proposed. In conclusion the realisation of the considered semantic models on the quantum supercomputer is proposed as the draft of the future paradigm of the development intellectual systems.

ARTIFICIAL INTELLIGENCE: PROBLEMS AND PROSPECTS

Meparishvili Badri¹ , Meparishvili Tamar², Janelidze Gulnara¹

1. Georgian Technical University,
2. Tbilisi State University, Georgia

Summary

This paper is consecrated to the modern Artificial Intelligence (AI) problems, to the comparative analysis between the capabilities of the Artificial Intelligence and human brain, consciousness. The description of the functioning of the human brain from the point view of the perception, of the shape recognition, of the treatment of texts and the behavior of the complex system. The synergetical neural network as a new approach of the solution of represented problems is proposed. In conclusion the realisation of the considered semantic models on the quantum supercomputer is proposed as the draft of the future paradigm of the development intellectual systems.

**SYSTEM OF TRAFFIC FLOW MONITORING ON THE BASIS
OF INFORMATION TECHNOLOGIES**

Gasitashvili Zurab, Abuladze Inga, Tsverava Vladimer

Georgian Technical University

Summary

The considerable increase of the quantity of car traffic flow conditioned the negative process which is reflected in the decrease of speed and traffic capacity which, in its turn, became the cause of many hours' road jams, particularly in rush hours. In order to solve the above mentioned problems the proposed system of traffic monitoring with the help of computer is the key factor which, in its turn, poses the demands regarding the above given problems.

**CREATION OF THE NEW INTERNATIONAL LANGUAGE – COMMAND
OF TIME**

Gvinepadze Gela

Georgian Technical University

Summary

the Article considers a problem of creation of the new international communication language. Its value for improvement of mutual understanding between people, as on usual - household, and scientific, etc. levels is underlined. Some new approaches for the decision of the given most complicated problem, in particular, participation in its development of experts from all world, automation of this process are offered, etc.

ON A GENERAL MODEL OF A TUTORIAL EXPERT SYSTEM

Kobiashvili Anna, Gvaramia Eka
Georgian Technical University

Summary

A tutoring expert system based on heuristic knowledge is described. A model of knowledge-based system capable of identifying data from their characteristics is being developed. The principle of searching for the adequate information for motivated students, based on a competent consultant and a tutor, is suggested.

LIQUIDITY ANALYSIS OF GEORGIAN COMMERCIAL BANKS

Giguashvili Nona
Georgian Technical University

Summary

In this work is carried out the liquidity analysis of Georgian commercial banks according to the common ratios. The results of calculation are compared to the normative ratios, which are determined by Georgian National Bank. There is established that Georgian commercial banks have the surplus quantity of liquid assets, which create the basic of depositor's calmness.

CREATION OF QUIZES BY COMPLEXITY IN THE LMS MOODLE ENVIRONMENT

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Summary

In this article general possibilities of a course management system Moodle are discussed. Here are represented the main tools of a quiz generation process, as well as all the question types available in the Moodle environment. As the open source system, Moodle allows users to create their own plug-in programs, to expend systems possibilities. In this article we have discussed principles how to create quizzes with the same coefficient of complexity that is not available in a Moodle environment yet.

BIFURKATION OF KHOPF FOR THREE-GENERATING SYSTEMS

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Summary

It is considered bifurkation of Khopf for multigenerating systems, in this case for three-generating systems. On the basis of the given mathematical model it is possible to define values of groups of parameters which correspond to points bifurkation and the indicator bifurkation of Khopf turns out. The schedule of transient of experiment, kind on a phase plane, and at last a result of experiment n-dimensional tor are received.

**DESIGNING DATABASES OF APPLICATIONS WITH THE
CATEGORIAL APPROACH**

**Surguladze Gia, Topuria Nino, Kashibadze Marina,
Saginadze David**

Georgian Technical University

Summary

There is considered the problem of automated construction of ER-model on the basis of UML and ORM. By means of the categorial approach and logical-algebraic methods object-oriented modelling for structures of data and knowledge of Application is carried out.

**THE CLASSIFICATION OF EMERGENCY SITUATIONS AND SOME ASPECTS
OF THE STATE SECURITY**

Shonia Otar, Odisharia Kornel, Elgendarashvili Tsira, Nareshelashvili Gulbaat

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Summary

The paper discusses the classification of emergency situations and some aspects of improving of the emergency control efficiency, one of the main guarantors of the state security.

**ABOUT ONE ALGORITHM OF MANAGEMENT OF THE DEADLOCK PROCESSES
IN THE OPERATIONAL SYSTEMS**

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Summary

Opportunities of existence (occurrence) of the deadlock processes in the operational systems and necessity of their exception are considered. The model of management by such processes on the basis of the tool of Petri networks is developed. The research on this model is carried out and corresponding time characteristics are constructed