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INFLUENCE OF FEATURES OF INFORMATION LEAKAGE CHANNELS ON INTELLIGIBILITY OF EAVESDROPPED VOICE MESSAGES

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Speaking about speech information primarily it comes to negotiating, meetings and so on. In preparing the premises for such events we focus on assessing of possibility of speech acoustic information leakage through technical channels being the object of the study.

Speech intelligibility is used as a quality criterion for acoustic channel of information leakage. During analyzing of information leakage in acoustic channels there are several features that impede using of well-known existing methods of intelligibility evaluation for estimation of channel protection. Such features are related to the couplings between eavesdropped speech and (a) level of channel-specific interferences or (b) semantic of a speech or (c) possibility to repeat a recorded message. The article presents results of investigations related to these features. The results of research (in graphs), which are shown in this article, the authors obtained experimentally. The obtained results improved the objectivity evaluating intelligibility of speech (and hence information security), as included the features of acoustic leakage channels, namely:

– takes into account the possibility of recording an acoustic signal and a further its repeated listening;

– takes into account fact that most often semantic speech is transmitted through the leakage channel;

– taken into account types of noise that are inherent office premises;

– takes into account imperfection of attacker's equipment that can cause audio clipping.

The results can be used as improvements of existing methodologies for estimation of information security hazards during analyzing of voice-channels, as well as for justification of requirements of appropriate technical means of information protection.

It is established that to guarantee speech information security must be realized the signal/white noise is not over –20 dB.

Keywords: speech intelligibility, semantic text, information leakage.

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DEVELOPING THE MODEL OF ECOSYSTEM IN NATURAL DISASTERS CONDITIONS

page 8–12

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The spatial model of ecosystem in natural emergency conditions dedicated to decision support tasks solving is described in the paper. The goal of research is decreasing the damage from the natural emergency by means of improving the quality and timeless of forecasting the territorial system dynamics in the natural emergency conditions.

The methods of topology, fuzzy sets theories, as well as geoinformation systems and web-technologies were used when performing research.

The concept of territorial system in natural emergency conditions in the form of overlaying static and dynamic topological spaces induced by indiscernibility relation is described. Each of the topological spaces allows representing geographical and attributive information about nature conditions, value objects demanding protection against natural emergency, as well as about natural emergency dynamics. The model of natural disaster dynamics in the form of fuzzy dynamic topological space is also described in the paper. This representation of natural disaster model has allowed to provide adaptability to incomplete and inaccurate information. The web-oriented decision support system is created on the base of developed concept and model.

The experiments have been conducted, which have shown that the proposed natural emergency model can provide reasonable characteristics in terms of accuracy and speed providing that the space is discretized with the size of cell from 8 m to 18 m.

Keywords: territorial system, indiscernibility relation, topological space, equivalence class, natural disaster.

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DEVELOPMENT OF MATHEMATICAL MODEL OF DECISION MAKING BASED ON ANALYSIS OF VALUES OF STAKEHOLDERS

page 13–18

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The values are one of the key concepts used in modern project management methodologies. Decision-making in the project without the participation and attention to the values of stakeholders leads to a failure in the projects.

The study describes the value of an interested party of the project as a set of indicators to assess its condition. The mathematical description of stakeholder relations to values is proposed. Based on the description of the relationship to the values, the objective function of maximizing the degree of security of the entire set of stakeholder values is proposed. Tangible and intangible assets owned or wanted to own by the interested party are presented as artifacts affecting the degree of security of stakeholder values. A formula is proposed for evaluating priority of artifacts resulting from stakeholder participation in projects.

An approach to the assessment of the current degree of security stakeholder values is proposed. The mathematical description is proposed for the portfolio of projects and programs, which involved stakeholders in order to maximize the level of security of their valuables. A description of the project is made as a process of transformation of artifacts owned by the interested party in the artifacts that it would like to own. The target decision-making function is given to change the portfolio in order to obtain the maximum level to ensure stakeholder value.

Recommendations for project leaders on the formation of values are given. Decomposing the project taking into account the priority of the artifacts, project manager provides the support of key stakeholders.

Keywords: stakeholder value of the project, objective function of decision-making, project artifacts.

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SYSTEMS AND CONTROL PROCESSES

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THE EFFECT OF SURFACE OBSERVATION ANGLE ON ACCURACY OF NON-CONTACT TEMPERATURE MEASUREMENT METHOD

page 19–22

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Thermal control by IR devices is a fairly difficult task, because it depends on a large number of external factors. The greatest error of contactless temperature measurement method is unknown or variable emissivity of the surface of the object. This is due to the fact that the ability of the object to emit infrared radiation can vary because it is depended on the material, properties of the surface, observation direction, and in the case of some materials – on temperature.

Technological audit was conducted to identify the variation characteristics of emissivity coefficient in terms of thermal control. The aim of audit was to determine the effect of observation angle on the emissivity coefficient.

Using thermal imager and auxiliary equipment it was found that with the measurement error is increased with increase of observation angle and may reach 50 %.

The authors conducted a series of experiments confirming the effect of observation angle on accuracy of temperature measurement, and proposed dependencies allowing to reduce the value of absolute error of measurement using IR devices to several degrees that in relative form less than 1 %.

Research results will improve the accuracy of temperature measurement by taking into account an effect of observation angle on emissivity coefficient of the object, normalize image thermograms for different sections of the object, as well as the select possible defective areas on the thermogram to determine the uniformity of thermal field.

Keywords: temperature, measurement error, IR equipment, thermal image control, emissivity coefficient, thermogram.

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ANALYSIS OF DESTABILIZING FACTORS OF INTERNAL SUSTAINABILITY OF URBAN PUBLIC PASSENGER TRANSPORT

page 23–30

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Analytical study of conditions and sources of destabilization processes of urban public passenger transport (UPPT) within its systemic representation, which allowed to identify cause-effect relationships of realization of potential of its internal sustainability through assessment of conditions of its internal structural elements. Analysis of factors of UPPT destabilization processes is based on selection of the analysis area, their identification, frequency analysis, separation of hazardous conditions, effects of destabilizing factors and risk formalization of their initiation. It is established that UPPT stabilization, which is an important component to ensure its internal sustainability in terms of defined areas of research, is characterized by conditions of ensuring transport demand of consumer subsystem, resource capacity of providing subsystem and functional processes organization of serving subsystem.

Based on the determination of areas and groups of UPPT destabilization factors block diagram of its destabilization, types and conditions of the mutual connection and influence of UPPT destabilization factors are revealed. Characteristic conditions to determine the state of UPPT objects relating to probability distribution of their destabilization are formed based on the analysis of the duration of technological operations. Cause-effect relationships of UPPT destabilization are presented from the standpoint of its internal sustainability.

Keywords: urban public passenger transport, destabilization of processes, internal sustainability, risk zone.

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USING OF VIRTUALIZED IT-INFRASTRUCTURE UNDER NORMAL OPERATION OF AUTOMATION SYSTEMS OF TECHNOLOGICAL OBJECTS

page 30–37

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Taking into account the global trends and experience of implementation of modern information technologies in production processes, with the aim of updating and increasing the competitiveness of Ukrainian industrial complexes, the issues and methods for using of hardware and software and technological solutions in the field of virtualization are considered.

The main method of research is computer simulation – simulation of real automation systems (including server component) using the tools of virtualization (Microsoft Hyper V). The essence of the method is creation of a virtual environment (infrastructure), including primary and backup server with process control system and workstations. Virtual machines of automation systems are fully meet their physical analogues by heir characteristics.

The ways of using of traditional automation systems, which are deployed on the basis of virtualization platform Hyper V, are considered. The main way of using of traditional software automation is their deployment on the basis of server operating system with support for one of the many virtualization technologies, such as: MS Hyper V, VMWare VSphere, Citrix Xen Server, and others.

An opportunity of practical operation of automation systems on the basis of virtualized hardware and software server complex with the thin clients as workstations is proved for Experion PKS system and Honeywell C200 controller. The process control system is deployed in a virtualized environment on the basis of server (Windows Server 2012 R2) and normal (Windows 10) operating systems.

The possible positive effect of implementation of modern IT infrastructure for technological objects is also analyzed. It lays in the fact of theoretically increase of fault tolerance level, practical simplification of system administration, and creation of bank for backup of virtual machines.

This result is associated with a more rational and efficient use of capabilities of modern computer systems (CPU and RAM), data storage systems (using of RAID hard drives) and software.

Keywords: automation system, IT infrastructure virtualization, hypervisor, thin client.

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INVESTIGATION OF THE EFFECT OF SHIP SIZE AND MARINE TRANSPORTATION DISTANCE ON THE POSSIBLE DECREASE OF VOYAGE EFFICIENCY

page 38–44

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The object of this research is the voyage efficiency of ship in terms of its deviation under the influence of risk factors. Time charter equivalent is considered as an efficiency indicator. The aim of this research is to establish the effect of the main characteristics of the ship and the voyage to the possible deviation of the ship efficiency.

During research the next methods are used:

– Regression analysis – to establish a kind of connection between the characteristics of the ship (voyage) and elements of the operating costs and income.

– Probability theory (characteristics and properties of the normal distribution law) – to assess possible deviations of voyage time.

– Functional analysis to investigate the effect of voyage and ship characteristics on possible decrease in the voyage efficiency.

Principal types of dependencies of income and cost elements for ship (freight rate, fuel consumption, port charges) in voyage on cargo capacity and transportation distance. Obtained patterns allow to formulate expression of efficiency parameter deviation of the voyage ship as a function of voyage and ship characteristics.

Conclusions about the effect of ship size and transportation distance on the possible deviations of voyage efficiency are made. In particular, it is found that possible reduction in the time charter equivalent with an increase in voyage duration is less significant than at shorter distances. Also, it is determined that a significant effect along with the standard deviation of voyage time has a level of freight rates – even its slight increase results in a notable difference in efficiency «losses».

These results allow to estimate the possible deviations of voyage efficiency under the influence of risk factors. Value of time charter equivalent deviation can serve as an additional criterion for decision about ship charter, along with parameters of the daily incomes and time charter equivalent, being a kind of risk assessment of voyage efficiency reduction.

Keywords: regression dependence, deviation, time charter equivalent, transportation distance, cargo capacity, probability.

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MODELING OF PASSENGER TRANSPORT CORRESPONDENCE BETWEEN REGIONAL CENTERS IN UKRAINE

page 44–48

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Passenger transport system of Ukraine is studied for establishment of passenger correspondence using public routes between regional centers. The results of the analysis of existing methods of passenger correspondence calculation are found the inability to implement them without preliminary investigation of features of the systems and calculation of the actual values of gravity function.

Empirical method is applied for establishing the parameters of quantitative index of gravity function. Unlike previous researchers, this approach for calculation of gravity function parameters allows to obtain new knowledge about the studied system. An opportunity to obtain performance parameters of the experimental system without the human factor and at any time is provided without the use of a manual or automated inspection means for passenger correspondence.

Research results provide the opportunity to analyze the calculations of intercity passenger correspondence between regional centers of Ukraine on the general transport routes using a gravity model. Previously unknown parameters of gravity function are defined. This allows to predict the passenger correspondence in this system.

Keywords: transport system, gravity model, passenger transport correspondence, intercity transportation.

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ANALYSIS OF ERRORS OF PROFILE TRANSFORMATION SCALE

page 48–54

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A necessity to improve the quality of textile products and reduce production costs associated with losses of raw materials in the processing requires the development of automated quality inspection systems for all steps of textile production. Promising is the use of contactless methods of nondestructive testing based on the methods of vision.

The object of research is a device to inspect the shape of textile packages by shadow projection method for monitoring in real time.

A series of experiments and theoretical research are conducted aimed at the study of structural parameters of the device to inspect the shape of the packing by the shadow projection method, providing the required accuracy. On the basis of the mutual arrangement of the structural elements of the light source, camera shutter and inspected bobbin, the impact of each of them on the scale transformation error for inspection of the package shape of cross winding is defined.

This result allows to select the mutual arrangement of design elements and to set their permissible variations of devices to inspect the package shape of cross winding by the shadow projection method.

Inspection of package shape in the process of their developments will prevent the formation of defective packages. It will increase a percentage of defect packages and the loss of raw material in the textile industry, which ultimately will raise its efficiency.

Keywords: shape of packages, cross winding, shadow projection, registration of parameters, profile transformation.

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