TECHNOLOGY TRANSFER IN THE TRANSPORT INDUSTRY

AN INVESTIGATION OF THE BUS HEADWAYS AND THE PASSENGER WAITING TIME ON THE URBAN ROUTES

page 4–8

Waiting time at stop for boarding in shuttle vehicles is most unwanted part of passenger transportation difficulty using public transport. The value of average waiting time at bus stop directly affects the degree of traveling satisfaction and is an indicator that determines the quality of transport services.

The article made a statistical analysis of bus headway at stops, located at the joint area of several routes in the city Zaporozhye (Ukraine) during the period of morning peak hours. The presence of significant linear correlation between expectation of network headway of different groups of buses, each of which corresponds to the selection of passenger variant, and its standard deviation.

It is established that the headway at bus stop for various groups of routes having inconsistent schedules with sufficient accuracy for practical calculations can be described by the law of the gamma distribution with shape parameter that, subject to the random passenger arrival at stop and equiprobable passenger distribution for groups of routes increases the average passenger waiting time at bus stop by 15–25 % in comparison with the case of regular bus traffic.

Keywords: urban public transport, headway, irregularity, waiting time, distribution law.

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INFORMATION AND CONTROL SYSTEMS

DEVELOPMENT THE METHOD OF ORGANIZING A SECURE DATA CHANNEL IN THE WATER SUPPLY MONITORING SYSTEM

page 9–12

This article describes a method of securing data in water supply monitoring system. The main aim of the study is to information security that is transmitted in the system of monitoring of water supply process through wireless networks. It is necessary to find a system architecture that will provide stability to the interception of information. In this paper we propose to use the encryption algorithm based on an asymmetric public key to create a secure TCP-session between the client (data acquisition points) and the server. This method allows creating a secure data transmission channel on the Internet using only one static IP-address from the data acquisition server. Studies indicate that this method has advantages over the use of the existing operating system in the data acquisition device. The author proposes to use this method of constructing the water supply monitoring system for data exchange between the data acquisition points and the server. The research results can be used by designers of water supply systems, automation and remote control, engaged in the field of water supply.

Keywords: monitoring, water supply system, wireless, single-board computer.

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RESEARCHING THE TCP/IP NETWORK WITH USING OF MODIFIED ACTIVE QUEUE MANAGEMENT REM-ALGORITHM WITH DYNAMICALLY SPLIT CHARACTERISTICS (DSREM)

This work is devoted to the description of the new method (algorithm) of active queue management (DSREM), developed on the basis of existing REM-method.

The object of the research is the system of network router buffer active queue management (AQM), corrected by REM-algorithm.

The main disadvantages of this system are the instability of the queue length parameters and the likelihood of marking the router buffer packet, as well as the increase in the percentage of lost and discarded packets with increasing load for data lines in TCP/IP network.

The article describes the work of active queue management REM-algorithm. A new, developed by the author and a previously unknown active queue management algorithm with improved quality characteristics (for packet loss and more stable value of the router buffer queue length) based on the REM-algorithm with dynamically split characteristic of control law (DSREM-algorithm).

Using TCP/IP-network modeling it is found that DSREM-algorithm in comparison with the REM-algorithm has the best performance for the lost and discarded packets, as well as more stable values of the queue length and the characteristics of the likelihood of marking packets with an increase in the number of incoming message sources.

The practical value and scientific novelty of DSREM-method modifying REM-method is to introduce specific parameters (scale factors and stability factor) in the original algorithm, which enhance network performance.

Keywords: active queue management (AQM), REM-algorithm, TCP/IP-network, dynamically split REM (DSREM-algorithm).

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DEVELOPMENT OF SUBSTITUTIONAL COMPUTATIONAL METHODS FOR MAXIMUM-LIKELIHOOD DETECTION OF THE OBJECT'S NEAR-ZERO APPARENT MOTION ON THE SERIES OF CCD-FRAMES

The objects with near-zero apparent motion during observation are the subject of study. The main disadvantage of such objects is the fact that the object's movement on a series of CCD-frames can be compared with errors of the position determining of the object.

We propose using the substitutional decision rules to detect object's near-zero apparent motion. These rules are based on the maximum-likelihood criterion and use a joint density of the measurements distribution as maximum-likelihood function.

Substitutional computation methods for maximum-likelihood detection of the object's near-zero apparent motion on the series of CCD-frames are developed. They are based on using of maximum-likelihood criterion in the decision rules of detection. Likelihood ratio is used as criterion for a sufficient statistic with minimum amount. This ratio is compared with the critical values selected in accordance with a predetermined criterion.

Using of the substitutional decision rules is justified by the absence of a priori information about likelihood function parameters such as parameters of the apparent motion of objects and dispersion of the positional measurements of series.

The article describes the cases with known, unknown variance of object's position measurements on the CCD-frames and using its external evaluation. Parameters of observed object's apparent motion should be previously estimated for using the synthesized decision rules. Also the corresponding interpolated coordinates on the investigated frames should be determined.

Keywords: series of CCD-frames, OLS-evaluation, object's position measurements, asteroids.

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SYSTEMS AND CONTROL PROCESSES

THE INTRODUCTION THE EUROPEAN APPROACH TO WASTE CLASSIFICATION IN UKRAINE

page 27–32

One of the areas of implementation of European legislation on waste in Ukraine is the European approach and the application of the principles of waste classification.

The object of study is European Union legislation and applicable legal acts of Ukraine regarding the classification of waste. The comparative analysis of the current Ukrainian and European legislation on waste showed a significant difference in the principles and approaches of waste classification. In National legislation waste is classified by the State Waste Classifier DK 005-96, where waste is no gradation in the degree of danger to the environment and human health. The legislation of the European Union developed a List of waste where the wastes are classified as dangerous or safe, and which is mandatory for use by all Member States.

To introduce in Ukraine European approach to waste classification at the State Waste Classifier DK 005-96 was set up national lists of waste, harmonized with the European List of Waste.

Using Lists it can be classified as waste produced in Ukraine, determine their affiliation to the safe or dangerous, and develop environmentally safe ways of waste treatment.

Waste classification by developed Lists will introduce internationally comparable data for environmental monitoring programs, and high-quality consistent statistics on waste generation and management.

Keywords: implementation, European List of Waste, national Lists of waste.

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IMPROVING THE HARDWARE AND SOFTWARE FOR CONTROL OF NORMALIZED PARAMETERS OF PRODUCTION FACTORS

page 32–39

The results of improving the hardware and software for control of normalized parameters of sanitary and hygienic factors of the workplace are shown based on previously developed using «Dolphin» type measuring stand.

Software and hardware of computer systems for control of the normalized parameters of production factors are studied.

The issues for empowerment of the measuring equipment through the use of mDAQ12 data acquisition microsystem and expansion of the range of the sensor are considered.

A block diagram of the hardware and software of the normalized parameters control is developed. Development of the hardware is completed. mDAQ12 data acquisition microsystem is used as the basis in return «Dolphin» type measuring stand used in previous studies. Development of a flexible software using LabVIEW platform is made that enables operational control of normalized parameters of production factors, by reducing time to conduct measurement and processing of measurement results of 9 physical factors, namely, noise, vibration, air velocity, temperature and relative humidity, pressure, infrared illumination and monitoring of air quality.

The adopted development concept allows creating a hardware and software package with the possibility of reconfiguration.

The proposed hardware and software also allows at least an order reducing weight and overall dimensions and improve economic performance, as well as halving the time and cost of software development by applying LabWIEV platform.

The results of the control simulation are shown. Research can be practically used for automated control of the sanitary and hygienic factors of production industry.

Keywords: hardware, software, measurement, control, information systems, LabVIEW platform.

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DEVELOPMENT OF CRITERION FOR COMPARATIVE ASSESSMENT OF EXECUTIVE SYSTEMS FUNCTIONAL ACTVITY

page 40–46

In this paper, the general principles of the comparative assessment of the results of procedural activity for objects of executive systems are developed.

The system of determining the baseline, relying on that provides accounting of all influencing factors and the possibility of developing a common assessment criterion are proved.

An assessment indicator that takes into account all the relevant input and output parameters, and allows comparative assessment of procedural activities of objects of executive systems is developed.

Versatility of developed indicator is demonstrated by the comparative assessment of the professional abilities of the subjects and in the decision of selecting the best variant of equipment.

Also it is developed a method that compensates for the inequality of expert assessments of input products when assessing the functionality of ES objects.

The proposed approach gives the possibility of using common assessment criterion and a common method of reducing the baseline to identify the results of operations of the technical facilities (equipment) and the staff.

Keywords: assessment criterion, assessment indicator, comparative assessment of the objects, estimation of operations.

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DEVELOPMENT OF METHOD OF EXPRESS INTERNAL COMBUSTION ENGINE DIAGNOSIS BASED ON WAVELET ANALYSIS

page 47–52

The method of rapid internal combustion engine diagnosis based on wavelet analysis of vibration signals during maintenance using automated parallel data collection systems is proposed. Software for processing and analyzing the diagnostic data is developed In the MATLAB environment. The experimental validation of the developed method is conducted. Analysis of experimental data allowed determining the defective engines using the vibration signal.

Diagnostic signals containing a frequency map of nondefective internal combustion engine VAZ are obtained during experiment, which allowed determining the deviation from the norm in diagnosed engines.

Disadvantages at this stage of the research include the need for storage of diagnostic information for each type of fault. Such information later will reduce the time of rapid diagnostic procedures and extend its capabilities. There is also a disadvantage is the need to expand the range of diagnosed internal combustion engine types.

Comparative analysis of the examples of initial diagnostic signals and their wavelet decompositions showed the possibility

of further use of the data for rapid internal combustion engine diagnosis.

The possibility of method will be substantially expanded with the accumulation of diagnostic features and improving the software, because the processes in internal combustion engines generate the necessary information about its technical condition as vibratory activity.

The research results can be useful for assessing the technical condition of the engines.

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QUALITY ASSESSMENT OF METALS AND ALLOYS UNDER HIGH-SPEED LOADING

The object of this research is analysis of parameters of metals and alloys under conditions of high-speed loading. One of the most problems in the research is the interaction between the impactor and the target, which is characterized simultaneously display of different effects, which determine the properties of the target and, in general, the impactor and the ratio of operating pressures and tensions that arise. So, some strength characteristics of steel grades are used as indicators of strength, because depending on the ratio of pressure and stress may highlight the areas of the most concrete demonstration of effects.

The study found that the existing expert approach to assessing the quality parameters of materials under high-speed loading does not ensure the production of mathematically reliable data. This is due to the fact that the materials of steel origin under the influence of impactor react by increasing cleavage strength, while local warming up in the materials of metal group there is transition in fragile state with a shift in the area with higher specific impact energy. It is found that ferritic-pearlitic steel have a low cleavage strength and martensitic steel — high cleavage strength.

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RELIABILITY ESTIMATION OF UNIVERSAL STAND FOR TESTS OF HYDRAULIC UNITS

The object of research is universal energy-efficient stand for tests of hydraulic units of different types, distinguishing feature of it is the use of an adjustable axial piston pump and piston hydro-pneumatic accumulator. Determination of reliability of such stand on the stage of its design will allow a reasonable choice to hold hydraulic equipment and units for its implementation. During the research it was built its block diagram. Using the method of block diagrams, an analytical dependence for calculating the probability of failure-free operation of the stand was

obtained. Probability and the average time of failure-free operation for different values of the failure rate were established. An accuracy of the calculations was estimated. It was shown that the proposed universal stand for tests of hydraulic units is the system with a high level of reliability.

Keywords: stand, hydraulic unit, reliability, probability of failure-free operation, failure-free operation time.

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ORGANIZATION OF TASKS DISTRIBUTION BY DEPARTMENTS OF PROJECT-ORIENTED UNIVERSITY

The tool maintenance is developed for organization of tasks distribution by departments of project-oriented enterprise, which includes: concept, fundamental structure of the information description of tasks in accordance with the project approach, ensuring the distribution of tasks for temporary periods.

Methodical approach to identify the tasks of project-oriented university is developed on the basis of the use of «business portfolio» concept, decomposition method and index system by the example of the educational activities of universities. At the same time all the tasks are divided into two categories depending on their nature and the presence of «uniqueness» — standard and specific, allowing to better organize their accounting and can be used to assess the degree of formation of project-oriented university in the proposed measure.

The concept of tasks distribution by departments in the system of project-oriented enterprise is formulated. This concept provides the organization of tasks performing with clear structuring objectives, time constraints and the necessary results for each task by a) systematic review of tasks within the network project models, b) integrated consideration of network models corresponding university projects portfolio.

Tool maintenance of organization of tasks distribution by departments on the basis of approach to identification of tasks in accordance with the stated concept is developed in terms of set theory.

Keywords: network model, set theory, project, distribution, task.

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DATA MINING OF THE RISK OF NATURAL FIRES BASED ON GEOINFORMATION TECHNOLOGIES

page 67–72

Natural fires are one of the biggest threats to the economy and population in Ukraine. Due to the limited materials and equipment it is necessary to redistributing them according to the level of danger. Therefore problems of fire risk assessment for the management of fire prevention at the national and regional level remain a problem of management in terms of situational uncertainty.

With a view to its elimination it was proposed based on mathematical tools to conduct data mining classification in Ukraine on grounds of belonging to the fire dangerous area. As the signs were chosen factors influencing the occurrence of natural fires: relief features, climatic characteristics and land cover. As a method was chosen classification features based on the decision tree algorithm C4.5, which allows to use existing classification criteria for classification of the surface cells to a particular class of fire risk.

Further use of the typical tools of GIS based on ArcGis platform allow to obtain the total value of the risk of fire danger based on raster algebra and summarize them for each administrative unit. The implementation of this zoning for Ukraine can detect the most dangerous areas in terms of natural fires and pursue advance training of human resources and preparation of material resources to prevent major damage from fires.

Keywords: data mining, natural fire, factor analysis, GIS analysis, classification, zoning, risk.

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