

ABSTRACT&REFERENCES

INFORMATION AND CONTROL SYSTEMS

SIGNAL CORRECTION IN ACCORDANCE WITH THE MOVEMENT OF THE OPTIMUM LISTENING AREA (p. 4-6)

Sergei Poroshin, Igor Belikov

Interactive participation of a human is becoming more and more popular in the management interface. The human motion capture is the next step in computer information control. Regular controls such as keyboards and "mice" will be replaced by a more interactive input-output control method. Now web cameras can detect human faces, human gestures and follow their movements in a frame.

The revolutionary technology of OpenCV is one of these developments.

The essence of this technology is the detection of facial features in an image-tracking and capturing hand movements, certain gestures and non-verbal commands.

OpenNI algorithm can convert human movements from a central location in a set of three-dimensional coordinate data. It can be converted to midi-messages and sent to the soundcard which makes adjustments to the volume of the acoustic signal from each of a sound system five channels.

It greatly expands opportunities of the stereo while listening the music and watching movies.

The aim of this research work is to combine the developments in the field of acoustic signal at the loudspeaker system 5.1 and the person location recognition system OpenNI. Knowing the coordinates of the 5.1 speaker system satellites and tracking human movements in the area, surrounded by these speakers, an engineer can further restore the pressure effect while listening to the audio tracks.

It improves the perception of sounds and music which come from the speakers, enhances the interactive human presence effect

Keywords: OpenNI; Native Interaction; VST-plugin; OpenCV

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SIMULATION OF PASSIVE SYNCHRONIZATION PHASE USING THE QUADRATURE SIGNAL-PROCESSING (p. 7-12)

Viacheslav Pryimak, Akram Husceyn

The article describes the principle of operation of the phase passive radio systems of frequency-temporal synchronization of diversity standards using the algorithm of general inclusion. The simulation provided the relations for estimates of errors and uncertainties of such systems, which are caused by the amplitude and phase distortions of signals, paths of equipment having the instability of the phase delay of signals, the ratio signal/noise.

This allows you to assess the potential of the method and improve the accuracy of the frequency-temporal synchronization of geographically distributed time and frequency standards.

The article also evaluated the threshold ratio signal/noise of changes described above, and presents the results of modeling of errors of phase passive synchronization systems, which are suitable for the matched filtration and correlation processing of signals in quadrature channels.

The results are applicable to the algorithm of general inclusion using the signals of geostationary satellites SBAS, which emit coherent signals

Keywords: correlated noise, multipath of error, matched filter, quadrature processing

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AUTOMATED IDENTIFICATION OF TYPE AND EVALUATION OF NOISE PARAMETER WITH MULTIFRACTAL INDICES (p. 13-17)

Marina Polyakova, Yuriy Emets

The method of the automated authentication of type and evaluation of parameter of additive-fluctuation, impulsive and multiplicative noise is worked out and investigated, and also the mixed noise on images by means of multifractal indices.

Descriptions of the worked out method are investigated on test images.

Method of determination of type and evaluation of parameter of noise are used in such areas of processing of images as medicine, astronomy, radio-location, non-destructive control, technical diagnostics and other areas.

A method consists of the next stages: choice of homogeneous area dark-and-light by a man-operator; calculation of multifractal indices as a vector of signs(H_x , H_y , H_{xy} , C_x , C_y , C_{xy}); determination of type of hindrance dark-and-light; evaluation of parameter of noise in the areas of multifractal indices and output of identifier of type and value of parameter of noise.

On the conducted results of experiment an offered method on the basis of multifractal indexes is better on 2,78%, what base a method with the use of neural network.

Worked out method at the evaluation of parameter of impulsive noise by value multifractal index it is recommended to apply at values the amounts of failure pixels of impulsive noise of 5% and higher.

The results of evaluation of parameter of multiplicative and gauss noise on a multifractal index showed the worked out method, that it is expedient to apply it for the choice of parameter of rough-down of image

Keywords: multifractal indices, authentication of type of noise, evaluation of parameter of noise, additive-fluctuation, impulsive and multiplicative noise

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SOFTWARE IMPLEMENTATION OF RELIABILITY MODEL OF RENEWABLE TECHNICAL SYSTEM WITH CONSTANT LOADED RESERVE (p. 18-23)

Bogdan Mandziy, Maxim Seniv, Bogdan Kuts

This paper describes the developed software product that can be used by specialists of radioelectronics and electrical engineering which are engaged in reliability design on system engineering level.

It significantly increases the effectiveness of comparative analysis of alternatives of technical systems reserving and of choosing the best based on reliability criterion. As a result of the research it was found that the current version of the software product quite correct and quickly simulates the reliability behavior of systems with the number of states that reaches 13000 (multiplicity of reserving is 5-6).

In case if the optimization is conducted and “leaks” of memory are fixed, then with a given hardware configuration there is a possibility of effective systems modelling with multiplicity of reserving to 10

Keywords: software, reliability, technical reserved system, software product, software reliability, reservation, permanent reserve, matrix states, graph of states and transitions, system

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RESEACH OF METHODS OF NOISE-IMMUNE CODING FOR METEOR DATA TELECOMMUNICATION SYSTEM (p. 23-27)

Alexander Vorgul, Yousif Sulaiman

The article presents the study of methods of the noise-immune coding and decoding for their further use in a digital transmission system (DTS).

This article is the next stage in the development of the DTS and the final step will be the review of the whole system in order to improve overall performance. Usually in modern literature, the modulation and coding are considered together, making it difficult to select and justify the method of modulation in the specific conditions of the meteor channel.

The objective of the work was the complete description of the coding and decoding algorithms, the definition of their complexity, parameters and characteristics.

The method of the study was a detailed mathematical description and computer simulation. The problem was considered from the point of view of the system as a whole. The work was performed using a computer simulation.

The main results of the work were a synthesis and analysis of the known algorithms, recommendations for the reasonable choice of the method and the coding algorithm for its further use in the DTS. The dependences of the number of bit errors on the signal / noise ratio were presented

Keywords: noise-immune coding, direct error correction; AWGN; meteor data telecommunication system

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USE OF INTELLECTUAL SENSOR Technics FOR MONITORING AND SEARCH AND RESCUE OPERATIONS (p. 27-32)

Anatolii Gurnyk, Stanislav Valuiskyi

The article studies methods for improving the organization of search and rescue operations involving aviation search and

rescue facilities using sensor networks, monitoring-signal sensing and geographic information technologies.

When collecting information from remote sensors with a single unmanned aerial vehicle (UAV), it is necessary to search for such a UAV flight path, which will enable to read data from all the sensors minimizing the total distance traveled and fuel consumption of the UAV.

This task is a classic geometric traveling agent problem that can be solved by one of the known methods of combinatorial optimization (method of exhaustive search, branch and bound method, etc.). However, these methods do not always produce optimal solutions and require a lot of computation time, and therefore require improvement.

This is possible using some euricability approaches. So, the article provides an improved method of collecting information from remote sensors using a UAV, which is different from existing by the fact that instead of lining the route of the UAV on all sensors, the route is laid on the centers of mass of groups of sensors. This allows reducing the dimension of the problem (increasing the efficiency of its solution) and significantly (17-23%) reducing the total path.

A variant of the practical implementation of wireless sensor network using Arduino evaluation boards and radio modules HVEE was suggested.

The models collected on their basis allow us to solve a number of applications such as monitoring environmental parameters, vehicle or UAV chassis control

Keywords: aviation search, sensor network, monitoring-signal sensor, unmanned aerial vehicle

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LAWS OF CHANGES OF EQUIVALENT DISTANCE OF FREIGHT TRANSPORTATION BY ROAD AND RAI (p. 33-37)

Yurii Davidich, Maria Olkhova

Recently, the demand for cargo transportation in insulated equipment has increased.

The main competitors in this traffic can be considered road and rail transport modes. The results of the expert survey of the freight market, allow the statement that the demand for freight transportation in insulated cars of different types is increasing. Existing methods of identifying areas of management do not conform to the concepts of logistics. One of the options to determine the scope of the rational use of means of transport is to find an equivalent distance of transportation.

Existing studies of the equivalent distance are based on motion and initial-end operations, not taking into account a number of factors that influence the choice of transport mode. A mathematical model of changing of economic profit of logistics system when transporting freight by road and rail was worked out. The use of the economic profit as a performance criterion allows taking into account implicit benefits and costs of the logistics system. Based on the data obtained during the modeling, the regularities between the technological and economic parameters of transportation and the equivalent distance with or without local railways were determined.

The use of these laws will improve the efficiency of the logistics system by optimization of the transport process

Keywords: equivalent distance, road transport, rail transport, logistics system, economic profit

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MEANS OF COMMUNICATION OF INTERNET USERS WITH LOCAL AUTHORITIES (p. 38-42)

Oleksandr Markovets, Roman Korzh, Ulyana Yarka

The article reviews the current state of processing of appeals and challenges, and problems arising in this case. These challenges require an integrated approach that involves the creation and use of specialized processing systems of appeals. In the basic configuration such system must serve as records, analysis and distribution of appeals and control over their processing. This article describes these features and system components that are responsible for their implementation.

The detailed description of components of specialized processing systems of appeals and their features are presented. The peculiarities of collecting and analyzing information about an author of an appeal, as well as their sources are given. Indices of credibility of the author and the resource of appeal formation are determined. Methods for determining a performer to process electronic appeals, their brief description and characteristics are presented

Keywords: electronic appeal, system of processing of appeals, performer, methods for determining a performer

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CORRELATION ALGORITHM FOR CHARACTER INFORMATION RECOGNITION WITH LOW-COMPLEXITY TECHNICAL IMPLEMENTATION (p. 42-45)

Oleg Kushnirenko, Andrej Sadchenko, Alexander Troyansky

Currently in machine vision systems a problem of recognition of the character information has become urgent. The solution to this problem is necessary for the recognition of license plates, labels on containers and railway cars, analysis of text documents, identification of the character information on printed boards and electronic components, etc. Optimum matching algorithm providing the highest probability of correct discrimination consists in calculating of the correlation coefficient between the recognizable symbol and the set of all patterns.

The article presents a simple algorithm to recognize the character information that does not use the advance segmentation and contour filtering.

The proposed recognition algorithm allows in one iteration to determine the coordinates of the characters corresponding to one specific pattern. The obvious advantage of this algorithm is the absence of multiplications. his reduces the computational complexity of the algorithm due to the lack of multiplication operations and reduction of the total number of additions.

Thus, the proposed algorithm has low complexity of the technical implementation

Keywords: recognition of the character information, correlation coefficient, binarization of an image, minimum distance, algorithm

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CONSTRUCTION OF SYNTHESIZERS TO PROVIDE ANALYSIS OF COMBUSTION GAS (p. 45-50)

Ihor Dilay, Zenoviy Teplukh

Efficiency of thermal power plants strongly depends on the control of quality of fuel combustion and, above all, on the ac-

curacy of the determination of composition of the combustion gases.

At the same time, their analysis should be performed by the chromatographic method, which accuracy and reliability of the results may significantly prevail over the methods used till now. However, the problem of metrological verification, which principal means are checked gas mixtures, prevents the effective use of chromatograph.

This article describes the principles of construction of gas-dynamic synthesizers of checked mixtures for the metrological maintenance of the gas analytical control devices of fuel combustion, including the current combustion gas chromatographs. The operation of synthesizer is based on mixture of pure components through metering capillaries.

The scheme provides compensation and stabilization of the main factors of influence.

The errors of selection of the capillaries with equal gas-dynamic resistances at one and different gases were estimated.

As an example of application of new principles of construction, the synthesizer is provided for preparing checked mixtures of main components of the combustion gases.

The use of such synthesizers in the energy sector gives an opportunity to manage the process of combustion in boilers more effectively

Keywords: synthesizer, checked mixtures, dosing capillary, analysis of combustion gases

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INTELLECTUAL INFORMATION TECHNOLOGIES IN THE TASKS OF PERFECTION OF THE HYDROMETEOROLOGICAL SYSTEMS (p. 50-54)

Mariia Valentiuk

In spite of the large accumulated volume of information in hydrometeorological industry and also necessity of multi-

dimensional analysis of these data, scientific work connected with the use of modern technologies of intellectual analysis for the increase of speed of analysis of hydrometeorological data was not conducted until now.

The reason for it might be lack of any competition in this branch of science.

The article deals with the technology of on-line analytical processing (OLAP) of the hydrometeorological data consisting in creation of a two-level subsystem of storage which is used for the first time.

The article presents schemes of operational and analytical databases with the description of requirements to them, and also describes the modules providing synchronization of data between these databases.

Possibility of creation of OLAP library of cubes on various measurements after the analysis of selections of the data necessary for employees of hydrometeorological branch for the analysis and forecasting is suggested

Keywords: OLAP-cube, hypercube, multidimensional depositories, hydrometeorological industry

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ESTIMATION OF THE IMPACT OF A SOFTWARE UPDATE ON INDICATORS OF RELIABILITY OF A FAULT TOLLERANT MULTIPROCESSOR SYSTEM (p. 55-59)

Bohdan Volochiy, Volodymyr-Myron Miskiv, Oleksandr Mulyak, Leonid Ozirkovskiy

This article outlines a Fault-Tolerant Multiprocessor System, designed for prolonged uninterrupted operation. During system operation software is updated with new versions, ensuring the increase of system reliability. The discussed model of the Fault-Tolerant Multiprocessor System is proposed to define reliability measures.

The design includes two multiprocessor systems (main and reserve), processors with a joint sliding reserve, a control processor and system diagnostics.

The model accounts for a software double update, as well as for automatic system reset after default caused by the hardware failures.

The duration of faultless performance of the fault-tolerant multiprocessor system is calculated, and compared between

two models: the proposed one, which takes into account the software update, and another well-known model, which does not include software updates

Keywords: reliability of hardware/software systems, fault-tolerant hardware/software systems, fault-tolerant multiprocessor system

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ADVANCED BROKERS FOR NORDUGRID ARC USING WEB-SERVICES (p. 60-63)

Anatoly Petrenko, Sergiy Svistunov, Pavlo Svirin

The development of science encourages an increase of experimental data, which subject to analysis to generate new knowledge. The current volume of computations often exceeds the capacities of a cluster to calculate for a satisfactory time; hence, it is necessary to distribute the computation of such amounts of data using the GRID systems.

For the load balancing in such systems, the special mechanisms - brokers – are used.

They implement a policy, under which such a system allocates tasks among computing resources according to the workload of computational resources in the system or according to properties of a task.

To implement the algorithm of balancing the broker must take into account enough factors to find the most appropriate

resource that is able to perform the task with the lowest possible load, or in minimal time.

At the same time, regular news sources of the software that serves GRID system and extras not included in the standard package of the software can be used. The aim of this work is to develop strategies and architectures for distributed broker in Nordugrid ARC 2.0 using advanced possibilities of this platform - web services that run on the basis of the software platform and extend the functionality of the cluster software.

The strategies developed should be of general purpose, therefore, they should not rely only on a certain type of tasks distributed among the available resources

Keywords: Grid, Nordugrid ARC, load balancing, broker, web service

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