

CONTENTS AND ABSTRACTS**TRANSMISSION AND PROCESSING OF INFORMATION*****B. Alpatov, P. Babayan, E. Maslennikov.* ALGORITHMS OF OBJECT POSE ESTIMATION FROM ITS TWO-DIMENSIONAL IMAGE IN ON-BOARD VIDEOTRACKING SYSTEMS**

Key words: pose estimation, Euler angles, geosphere, fast Fourier transform, structural analysis, texture analysis.

Problem of object three-dimensional pose estimation from its two-dimensional image using 3d-model of object is considered. A general approach to the problem and three algorithms based on this approach are described. Results of experimental research of these algorithms are shown.3

***A. Kuznetsov, V. Nefedov.* MODEL OF DIGITAL COMBINATION OF HYDEOMETEOROLOGICAL SATELLITE INFORMATION**

Key words: models of coordinate compliance, digital combination, series of satellites «Meteor-M», IKFS-2 and MSU-MR scanning devices.

The article considers mathematical model of combining measurements from digital scanning equipment, installed on meteorological satellite «Meteor-M». The model contains mathematical relationships on which the measurement of one sensor is supplemented by information of another sensor. On its basis the software producing new type of information products having 1d processing level is developed.8

***V. Zlobin, B. Kostrov.* THEORETICAL AND METHODOLOGICAL ASPECTS OF VILENKIN-KRESTENSON FUNCTION SYSTEM APPLICATION FOR IMAGE PROCESSING**

Key words: orthogonal functions, Vilenkin-Krestenson functions, dyadic convolution, Rademacher function, aerospace images filtering.

The problem of Vilenkin-Krestenson functions applications to process aerospace images is considered. Some theorems underlying the methodology for applying transformations built on data system functions are given.14

***B. Alpatov, O. Balashov, A. Stepashkin.* MEASUREMENT OF ANGULAR COORDINATES OF LINE OF SIGHT IN HELMET-POSITIONING SYSTEMS**

Key words: helmet-positioning systems, angle measurement.

One of possible construction variants of helmet-positioning systems is considered. The algorithm of computing of angular coordinates of helmet is present.19

***S. Elesina, A. Loginov, M. Nikiforov.* METHOD OF SEARCH ALGORITHMS SELECTION FOR GLOBAL OPTIMIZATION MULTIPLE-FUNCTION**

Key words: optimization methods, global extremum, global optimization search algorithm, criteria for evaluating the algorithms, objective function

This paper proposed a method to select search algorithms for global optimization on the example of combining images in correlation-extremal navigation system.23

TR. Nguyen. ALGORITHMS OF THREE-DIMENSIONAL RADIO IMAGES FORMATION ON THE BASIS OF DOPPLER FILTRATION AND ESTIMATION OF COORDINATES

Key words: three-dimensional radio image.

Algorithms of formation of three-dimensional radio images of terrestrial surface in on-board Doppler radiolocation stations based on angular coordinates estimation methods are offered. The results of algorithms modeling are represented. Estimation of calculation operations is done27

RADIO ENGINEERING AND MEASURING SYSTEMS

S. Kirillov, V. Berdnikov, E. Akopov. MODERNIZATION OF BOC-SIGNAL ALGORITHM DETECTION IN ORDER TO REDUCE SIDE-LOBE LEVEL

Key words: BOC-modulation, detection of BOC-signal, correlation function, suppression of side lobes.

An experimental comparison of existing algorithms for detecting signals with meandering sub-carrier (BOC-signals) is made. It is shown that methods of sidelobe suppression can reduce ambiguity of BOC-signals detection without deterioration of detection compared to BPSK-signals. A modification of side lobe suppression algorithm, which allows to get (after detection of BOC (1,1) and BOC (2,1) signals) a gain in signal to noise ratio up to 1.5 dB, due to use of synthetic auxiliary signals that obtain better match spectra of main and auxiliary signals, or more accurate tuning of auxiliary form to the shape of correlation function side lobes32

V. Andreyev, T. Nguyen, A. Narbekov. ADAPTIVE FILTERING OF COMBINED INTERFERENCES

Key words: combined interference, adaptive filtering, whitewashing filter, interferences reduction.

We offer a simplified algorithm for estimating the coefficients of FIR suppressing filter to increase the average over Doppler velocities detection probability by 10%...20% compared with the known (non-adaptive) whitening filter. The algorithm does not require inversion of the interferences' correlation matrix when the power of uncorrelated interfering components changes, thus reducing the computation cost (number of arithmetic operations) by 1,7...1,4 times as compared with the optimal adaptive algorithm.....38

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Key words: Error correction codes, list-decoding algorithm, soft decoders, syndrome of error-correcting code, optimum decoder.

An algorithm for soft decoding block codes based on modification of list algorithm using syndromes to reduce memory expenses is offered. The analysis of computational resources required to implement this algorithm is given. It is shown that modification of algorithm allowed to reduce 3 times memory volume for Bose-Chaudhuri-Hocquenghem code41

V. Revutskiy. ALGORITHM FOR ESTIMATING PARAMETERS OF ERROR-CORRECTION CONVOLUTIONAL CODES

Key words: error-correction code, convolutional code, analyzed binary sequence, satellite communication system, length of code block.

The algorithm to estimate parameters of convolutional error-correcting codes used in satellite communications systems is proved. It is shown that proposed algorithm provides a probability of correct decisions about parameters of codes at least 0.87 for values of bit error probability in analyzed binary sequence not more than 0.00246

S. Kholopov. WIDENING LOCKING BAND OF RELAY ASTATIC PLL

Key words: astatic PLL, relay phase discriminator, nullable integrators, steady phase error, locking band.

Formulas to describe relay astatic PLL with nullable integrators block and nonlinear voltage changes that allows the system simultaneously provide both a low level of steady phase error and comparatively wide locking band are derived. The relations on the basis of which for a given value of phase error locking band of system can be estimated and nullable integrators parameters can be determined are obtained49

COMPUTER ENGINEERING AND APPLIED MATHEMATICS*E. Nikulchev, S. Payain, E. Pluzhnik.* DYNAMIC TRAFFIC CONTROL OF CLOUD INFRASTRUCTURE WITH SOFTWARE-DEFINED NETWORKING

Key words: computer networks, traffic control, cloud computing, dynamic models.

This article is devoted to developing algorithms for dynamic traffic control in the network focused on cloud infrastructure. Proposed algorithm is implemented as a software router configuration54

A. Prutzkov, D. Tsybulko. DOMAIN-DRIVEN OBJECT PROGRAMMING

Key words: natural language processing, automatic translation, converting of cardinal numbers.

We offer a method of programming, which describes a program as descriptions of domain-specific object and its interaction. We name it domain-driven object programming. The method uses minimal amount of structures and instructions. Our method allows to develop and verify programs faster and change them efficiently.....57

R. Medvedev. ISOMORPHISM IN THE ONTOLOGICAL MODEL OF KNOWLEDGE OF DISTANCE LEARNING INTELLECTUAL SYSTEM

Key words: distance learning, ontological model, accumulation of knowledge, descriptive logics.

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A. Varnavsky, A. Antonenko. DEFINITION OF HUMAN-MACHINE SYSTEMS OPERATOR PACEMAKER USING FUZZY LOGIC

Key words: pacemaker, electrocardiosignal, fuzzy inference system, membership functions, fuzzy rules of productions, membership grade of statements.

The paper describes the possibility of determining operator pacemaker by sharing nonlinear integral transform and fuzzy logic, which allows to analyze in real-time. A system of fuzzy logic is proposed, membership functions and fuzzy rules are defined. The ratio of truth degree value of rule-winner to truth degree value of any other rule equal at least 3 is shown.....65

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V. Alexandrov, N. Makarov, A. Shustov. AUTOMATED ANALYSIS AND EVALUATION OF ARTICLES OF COLLECTIVE TREATY

Key words: efficiency of collective agreement, natural language processing, processing of cardinal numerals.

We propose an implementation of automated analysis and evaluation of the effectiveness of collective treaty implementing contractual form of regulation of labor relations. The method is based on usage of quantitative performance indicator, which is calculated directly from treaty text by identifying and summarizing articles realizing its legal functions. An example of method realization by means of information technology is given. To reduce overall analysis time contracts we propose to automate the process of assessing the quality of legal expert articles analyzed using the method of wordform and numerals of natural languages processing. Developed system is an automated analysis of the treaty embedded in the departmental laboratory automated analysis of collective bargaining acts in RSREU..... 71

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Key words: ontology, web-service, SOA, description logic.

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O. Faleyev. MATHEMATICAL MODEL OF AGGREGATE TECHNICAL AND SOFTWARE COMPLEX MODULE

Key words: aggregation module complex model.

In this paper, a mathematical model of aggregate unit complex hardware and software systems to create test automation products of space and rocket technology is offered 79

ELECTRONICS

I. Syrmolotnov, A. Astashin. RESEARCH OF INTENSE-DEFORMED CONDITION OF ELASTIC ELEMENTS FOR ASW-SENSORS

Key words: SAW-structure, SAW-sensor, interdigital transducer, mechanical strain and deformations.

The algorithm of calculation of parameters of membrane elastic sensitive SAW-sensors' element is offered. We performed researches, which allow to define character of distribution of mechanical deformations and strains, and their size depending on the way of stressing, setup stiffness and the sizes of membrane, coordinates, form and the sizes of SAW-sensors' active area..... 83

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Key words: electron-electronic infraction, random-phase approximation.

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MANAGEMENT OF SOCIAL AND ECONOMIC SYSTEMS

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Key words: technical system, optimization, parameter, evolutionary approach, evolutionary algorithm.

The problem of complex technical systems parameters optimization is considered and possibility of use of evolutionary approach for its decision is investigated. The scheme of optimization system functioning based on evolutionary approach is resulted. The algorithm of optimization problem decision based on evolutionary approach is offered. Practical optimization problem of covering of the object, supervised by shooting system, is solved..... 93

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Key words: algorithm, data, event, planning, uncertainty, ontology.

The suggestion about implementation of data representation structures for events with variable time features and dynamic planning algorithms for such kind of events is given 101

BRIEF NOTES

P. Pokrovsky. THE PROCEDURE DETECTING RADIO SIGNALS WITH CONTROL COUPLING BETWEEN QUADRATURE COMPONENTS

Key words: shift keying, detections, FQPSK, GMSK, spectral efficient signals.

A universal procedure for the detection of radio signals with controlled coupling between quadrature components is proposed. It is based on the method of maximum a posteriori probability in the case of action in the channel with additive «white» Gaussian noise. During the simulation it is shown that in the case of application of developed procedures for detecting signals from FQPSK, GMSK and T-OQPSK radio noise immunity up to 0.05 dB corresponds to the theoretical one..... 110

V. Zimenko, A. Zimin, V. Shmatkov. THE SOLUTION OF TRAFFIC MINIMISATION TASK TAKING INTO CONSIDERATION GOODS LIQUIDITY

Key words: sets, boolean lattices, transport tasks, linear inequalities.

This article is devoted to the theory of linear inequalities on sets. An example shows how such tasks can happen in practice and the method of their solution is shown 113

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