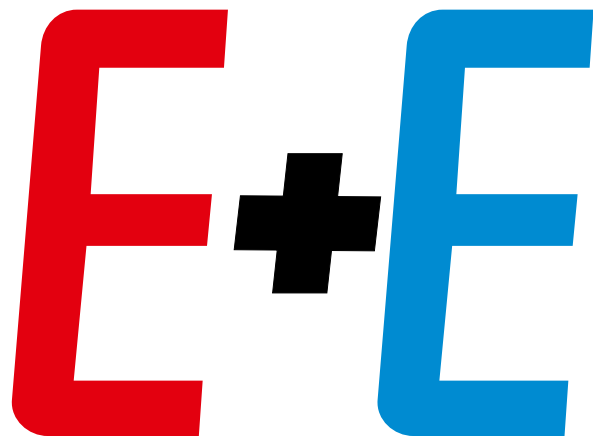


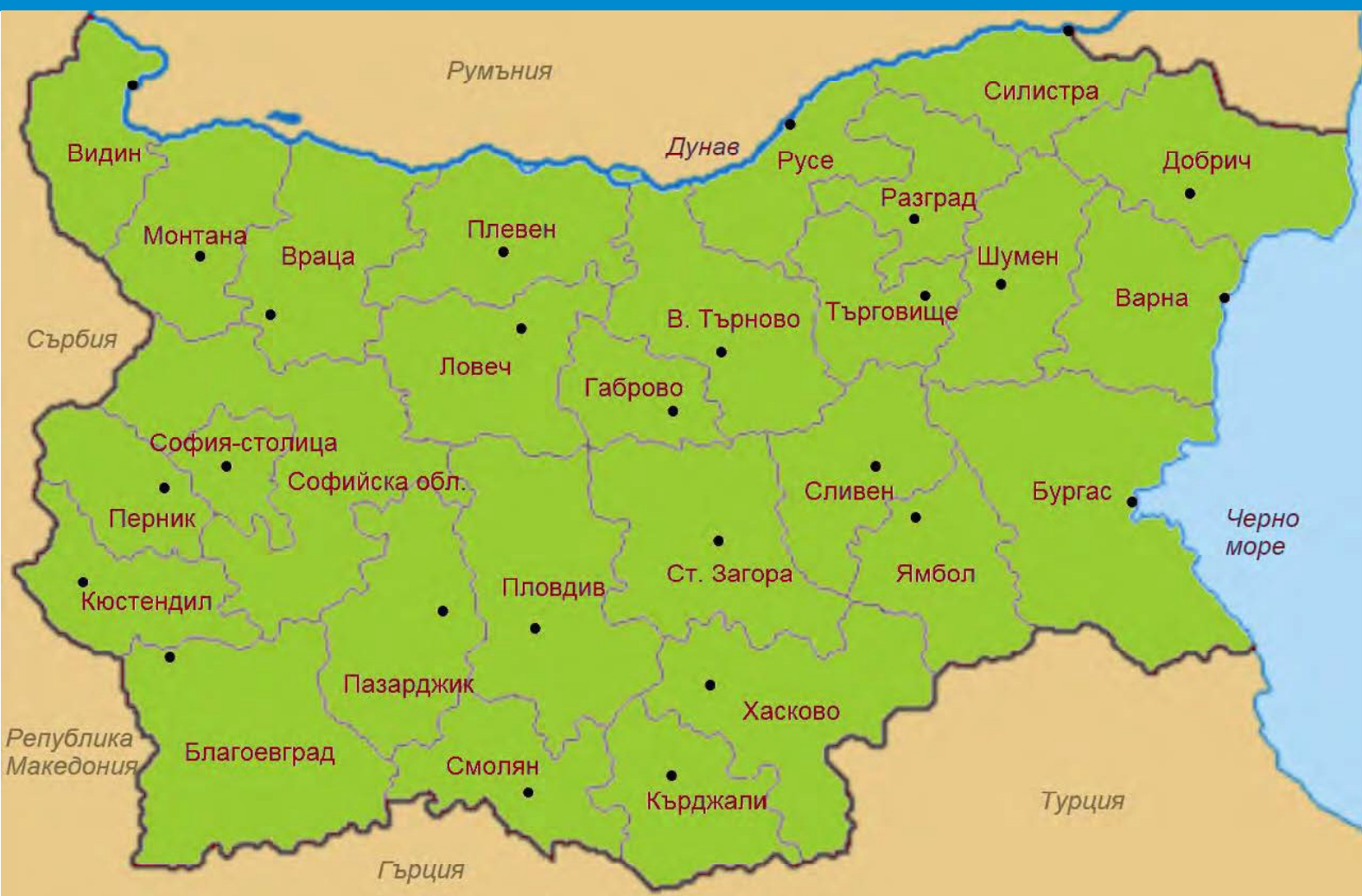
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108, Rakovski Str., 1000 Sofia, BULGARIA
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Corresponding address:

PO Box 98

108 "Rakovski" str.

Sofia 1000

BULGARIA

Tel. +359 2 987 97 67

+359 2 988 01 98

e-mail: epluse@mail.bg

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CONTENTS

COMMUNICATION TECHNICS

Elena A. Bakhtiyarova

Quality of reproduction of oral Kazakh speech in stochastic digital systems of transfer at its statistical consolidation 2

Evelina Pencheva

Design considerations for application layer IP-based protocol for mobile monitoring 6

ELECTRONICS

Tsvetomir N. Lazarov

Simple hardware platform to transfer data from CMOS image sensor to personal computer 13

Radosvet G. Arnaudov, Svetozar K. Andreev

EM Study of via stitching impact on parallel grounding planes in multilayered PCBs and electronic packages 19

Katya K. Asparuhova

Using random signals with predefined statistical properties for the study of circuits in PSpice environment 27

COMPUTER TECHNICS

Stoyan B. Bonev, Volin A. Karagiozov, John E. Galletly, Dimitar G. Christozov

Arrays and programming languages 31

ELECTRICAL DRIVES

Vasil D. Dimitrov, Emiliya A. Dimitrova

Research of PWM pulse frequency influence on the asynchronous drives characteristics – laboratory simulator 37

CONTROL ENGINEERING

Snejana Yordanova, Aneliya Georgieva

Genetic algorithm based optimization of Fuzzy controllers tuning in level control 45

Quality of reproduction of oral Kazakh speech in stochastic digital systems of transfer at its statistical consolidation

Elena A. Bakhtiyarova

Definition of characteristics of the message of oral Kazakh speech and their models, their use for estimation of quality of restoration of speech in telecommunication systems, application of results in industrial activity of subjects taking into account requirements of the International union of telecommunication are represented by actual problems for telecommunication networks of Republic of Kazakhstan. Now for increase in efficiency of process of transfer are created and widely use the digital systems of transfer (DST) with deliberate introduction of stochasticity in digitization process. The relation of power of a speech signal to capacity of noise of digitization and restoration (RSND) of the message of the oral Russian and Kazakh speech messages with fixed and with alternating priorities is defined

Качеството на възпроизвеждане на устна казахска реч в стохастични цифрови системи за предаване при нейното статистическо обединяване (Елена Бакхтиярова)

The share of the speech traffic now increases in loading of telecommunication networks of Republic of Kazakhstan, scopes of application of speech services that brings to necessity of increase in number and efficiency of use of available channels extend.

In the conditions of intensive development of telecommunication networks practically there is no information on probability characteristics of the message of oral Kazakh speech, its analytical models.

Phonetic, morphological and syntactic differences of the Kazakh language from Russian should lead unexplored till now to differences in probability characteristics of the message of oral Kazakh speech, to their analytical models.

Under stochastic DST (SDST) it is understood DST, on an input of restoring which devices arrives stochastic stream of readout digitization speeches [1], [2].

For the analysis of quality of reproduction of the Kazakh speech by various realizations of statistical consolidation distribution of probabilities $P(X)$ a random size of X quantity successively the rejected readout in a recurrent stream on an input of the interpolating filter of the additional complete set is necessary.

As the entrance data two files of type «RAW» (byte-serial of a stream of readout PCM with the parameters defined by recommendation G.711 ITU-T), received by converting of real audio records of

telephone conversations of two pairs subscribers are used with the purpose of definition of statistics of collisions, «collision of readout» the basic and additional complete set each readout of the basic complete set is transformed to a kind "active/passive".

In work [3] it is defined sufficient (for imitating modeling) duration of realization of the speech message (L in readout and t in minutes) with using of development of an estimation of probability θ rejection of readout of the additional complete set and a relative error $\delta\theta$, % of its definition.

From Fig.1 it is visible that value of an estimation θ is practically stabilized (at condition performance $|\delta\theta| > 1\%$) at $t \geq 20$ minutes. We choose with a stock durations $L=14\ 400\ 000$ readout (30min.) for realizations of speech messages of the basic and additional complete sets.

The result of modeling – distribution of probabilities $P(X)$ a random size of X quantity successively the rejected readout in a stream on an input of the interpolating filter of the additional complete set in the conditions of the fixed priority is presented in Table 1 [4].

In Table 2 approximation of this distribution (geometrical distribution) for the message of the Kazakh speech is presented at the value received as a result of modeling $\theta = 0,034$ (in the conditions of the fixed priority) [4].

Design considerations for application layer IP-based protocol for mobile monitoring

Evelina Pencheva

Ubiquitous penetration of communications between smart objects in Internet Protocol (IP) based networks, requires considering aspects that influence on reliability and performance. The paper studies application layer issues related to reliable message transfer and overload control. A layered application protocol structure is proposed, that in addition to core protocol functions, provides transaction processing. Existing overload control mechanisms used at application layer in IP networks are evaluated and adjusted to mobile monitoring applications.

Аспекти на проектирането на IP-базиран приложен протокол за мобилен мониторинг (Евелина Пенчева). Повсеместното навлизане на комуникациите между интелигентни устройства в мрежи, базирани на Internet Protocol (IP), изисква изследване на аспекти, които влияят на надеждността и работоспособността. Статията изследва проблеми, свързани с надеждно предаване на съобщения и управление на натоварването, реализирани в приложния слой. Предложена е слоеста структура на приложен протокол, който в допълнение на основните функции за мобилен мониторинг, осигурява обработка на трансакции. Оценени са съществуващи механизми за управление на претоварванията в приложния слой на IP мрежи и е направено адаптирането им за приложения на мобилен мониторинг.

Introduction

Internet of Things (IoT) is the development of Internet from network of interconnected computers to network of smart objects. Smart objects are equipped with sensors and actuators providing the ability to acquire data from the physical environment, and communication devices enabling data transfer and receiving inputs from other smart objects. Internet Protocol (IP) architecture and protocols for smart object are widely adopted because they support the requirements to smart objects such as scalability, diversity of applications and communication technology, interoperability and standardization.

One of the IoT application areas is the area of mobile monitoring which deals with remote measurements. The requirements to mobile monitoring application layer protocols are subject of intensive research studies. Different aspects of telemetry functions and their implementations in mobile agents are discussed by [1], [2], [3]. Main issues in the design of a mobile monitoring protocol concern reliable data transfer and performance. Solutions that use IP based platforms exploiting Transmission Communication Protocol (TCP) are proposed in [4] [5]. For real time applications, e.g. health care or vehicle telematics, the application layer

protocol runs on top of User Datagram Protocol (UDP) as a transport-layer protocol [6]. UDP provides a best-effort datagram delivery service i.e. the underlying IP network does its best to deliver the datagrams, but there is no guarantee that the datagrams are delivered at the destination. In the context of IoT applications, UDP has many benefits. First, UDP has a very low overhead for both header size and protocol logic. This means that both the packet transmission and reception consume less energy which is in favor of the application layer data. UDP is well suited to traffic with low reliability demands, e.g. for smart objects that report data periodically within a system for home automation or eco monitoring. Since data are sent periodically, a casual packet lost is not critical as the new reading will be sent soon enough anyway. For mobile monitoring applications with high reliability requirements as healthcare, it is possible to provide reliability at the application layer.

In hierarchical network architectures, congestion and overload mechanisms pose significant challenges to the IoT network [7], [8]. Significant research is devoted on control mechanisms aimed to improve the radio network overload and delay performance in machine type communications [9], [10], but not on the application layer control mechanisms.

Simple hardware platform to transfer data from CMOS image sensor to personal computer

Tsvetomir N. Lazarov

This paper presents simple CPLD based frame capturer designed for fast and easy transfer of a picture from CMOS image sensor to personal computer where it is processed. It is designed as a supporting tool in laboratory experiments and is constructed by accessible and affordable components. It works along with some readily available optoelectronic system which contains image sensor and monitor. The user can select the image of interest and by that to start frame capture process. The main functions are storage of the pixels into external RAM and byte transfer through serial communication interface to PC. No data processing is applied except adding to every picture element "pixel color" information usable for synchronization and error checking. The platform is flexible to work with image sensors that have 10 or 12-bit output data bus. Its architecture and available resources allow adding of functions for parameters setting through PC or manually.

Опростена платформа за прехвърляне на данни от CMOS матричен сензор към персонален компютър (Цветомир Лазаров). Настоящата статия представя устройство за прихващане на кадри, базирано на чип с програмируема логика CPLD. То е предназначено за работа в лабораторни условия и е изградено от достъпни компоненти. Проектирано е за опростено и лесно прехвърляне на картината от CMOS матричен фотосензор към персонален компютър, където допълнително ще се обработва. Работи заедно с готова оптоелектронна система, включваща матричен сензор и монитор. Потребителят може да избере тази картина, която го удовлетворява и така да даде начало на процеса за сваляне на кадъра. Основните функции са съхранение на пикселите във външна RAM памет и последващото им прехвърляне към компютър през асинхронен сериен комуникационен интерфейс. Не се извършва обработка на кадъра, освен добавяне на информация за цвета на пикселите, която може да се използва за синхронизация и откриване на грешки. Структурата и наличните ресурси позволяват добавянето на функции за задаване на някои параметри.

Introduction

Image processing is modern and fast growing area in the field of information technologies. It finds more and more applications in all aspects of the modern day's society – industry, science and education, military, medicine, entertainment and so on.

Data acquisition from the image of the observed object is a process that is mostly comprised of sequential execution of a set of functions over the image elements. In some cases, processing of several sequential frames is needed to obtain the required information, but most of the applications work with one frame at a time. In order to test the execution, the final result and the effects of certain image processing function, when it is applied to a frame in a real system, the test procedure should include as input data

genuine frames. They should contain images of the examined object and should be as much as possible close to those that the real optoelectronic system (OES) will encounter and will process.

The test of image processing functions and algorithms is made by analysis of the image and the information gathered at all stages. As a result from the test procedure, the designer will have at its disposal a data about the correct processing sequence, individual and total execution times, required processing resources, final result precision and tolerances, presence of unwanted artifacts, etc.

The choice of methodology to test certain function is of significant importance and its results could affect the design process. There are two main approaches for analysis and evaluation of functions and algorithms.

EM Study of via stitching impact on parallel grounding planes in multilayered PCBs and electronic packages

Radosvet G. Arnaudov, Svetozar K. Andreev

Electromagnetic study of via stitching impact on the cavity-resonance modes in multilayered parallel-plate planes of ground rectangular structures is presented. Such structures are widely used in microwave multilayer PCBs, electronic packages, MCMs and could be the source of considerable electromagnetic interference (EMI). Effective methods should be applied for damping and elimination of the radiated fields, especially in small areas and volumes. The investigated three-layered low temperature co-fired ceramics' (LTCC) package (QFN-type) possesses two separate grounding planes on different levels, connected through multiple via stitches. The estimation of the electromagnetic field distribution is conducted by full-wave analysis of the proposed cavity-resonance models and corresponding S-parameters are extracted. This paper also discusses the influence of matrix-like via grid distribution on the propagation constant and effective dielectric permittivity of the exemplary structure in the frequency band of interest - 10 to 30 GHz.

Електромагнитно изследване на влиянието на „съшиване” чрез проходни отвори върху паралелни заземяващи равнини в многослойни платки и електронни корпуси (Радосвет Г. Арнаудов, Светозар К. Андреев). В статията са представени резултати от електромагнитно изследване на обемни резонансни модове на вълни в многослойни паралелни равнини на заземяващи правоъгълни структури. Такива структури са широко използвани в микровълновите многослойни печатни платки, електронни корпуси, мултичипни модули и могат да бъдат източник на значителна електромагнитна интерференция (EMI). Необходимо е да бъдат приложени ефективни методи за намаляване и елиминиране на излъчващите полета, особено в малки площи и обеми. Изследваният трислоен корпус, тип QFN, изработен от нискотемпературна многолистова керамика, притежава две отделни заземяващи повърхности на различни нива, свързани чрез множество проходни проводящи отвори (via). Изследването на разпределението на електромагнитното поле е проведено чрез пълно-вълнов анализ на представените обемни резонансни модели и са изведени съответните S-параметри. В статията се обсъжда също и влиянието на разположението на проходните отвори във вид на матрица върху константата на разпространение и ефективната диелектрична проникваемост на примерната структура в честотния обхват 10 – 30 GHz.

Introduction

The continued growth of personal communications with wireless applications has generated a great demand for portable and highly integrated components and subsystems. As a consequence, these applications challenge electronics packaging technologies to integrate smaller, lighter, high density, mixed-signal integrated circuits in low-cost multilayer PCBs, packages and modules.

Power and ground parallel-plate planes are often employed in multilayered structures. At frequencies where the dimensions are not electrically small, it is necessary to use complex distributed models for their investigation. Very important factor in the parallel-

plate structure study is the radiated EM field evaluation at the far-field zone. This task is carried out by a number of authors in [1], [2], [3] where analytical models and closed-form expressions are derived. The level of the radiated emission intensity is straightly proportional to the spacing between the planes and inversely proportional to the value of the relative dielectric permittivity of the substrate. The main approaches, employed in these works, are based on the calculation of the location- and mode-dependant impedances Z_{ij} of the parallel-plate wave guide structures [2] and including the radiation losses in the complex or modified wave numbers of the dielectric media [3]. Effective suppression and damping of EMI

Using random signals with predefined statistical properties for the study of circuits in PSpice environment

Katya K. Asparuhova

In the present paper an extension is developed of the possibilities of the PSpice type programs for simulating electronic circuits for the case of random input signals with predefined statistical parameters. Built-in signal sources in PSpice are deterministic in nature, with known or specified amplitude at any point of time. The following is available: pre-generated pseudorandom number series with statistical parameters reflecting those of the actual signals in electronic circuits can be perceived by the simulator as input sources. Random signals with a certain type of power spectral density in a normalized form are pre-recorded in format suitable for use in PSpice. The user can further customize in the PSpice environment the statistical characteristics of the signal, such as average and variance according to his needs. The possibility to set the new input for simulation and analysis of the designed electronic circuit is shown. The proposed method is experimentally verified and the fidelity of statistical characteristics is considered.

Използване на случайни сигнали със зададени статистически параметри за изследване на схеми в средата на PSpice (Катя Аспарухова). В статията се разглежда разширяване на възможностите на симулаторите от вида PSpice за симулиране на електронни схеми чрез случайни входни въздействия с определени статистически характеристики. Вградените източници на сигнали в PSpice са с детерминиран характер; известна или зададена амплитуда във всеки един момент от време. Предлага се: предварително генерирани псевдослучайни числови редици със статистически параметри, отразяващи тези на реалните сигнали в електронната апаратура да могат да се възприемат от симулатора като входни въздействия. Случайни сигнали с определен вид спектрална плътност на мощността в нормализиран вид предварително се записват във формат за използване в PSpice. Потребителят допълнително може да промени в програмната среда на симулатора за своите нужди статистическите характеристики на сигнала, например средна стойност и дисперсия. Показана е възможността да се зададе новият входен сигнал за симулация и анализ на проектирана електронна схема. Предложеният метод е експериментално проверен и е разгледана точността на възпроизвеждане на статистическите характеристики.

Introduction

The proposed paper presents the possibilities for generation of discrete time signals with predefined statistical and frequency parameters, corresponding to the real input or noise signals for analog circuits. A method and a program implementation in the MathCAD environment are shown. The signals are statistically modeled by three different autocorrelation types of functions (with predefined dispersion, time correlation and duration). The generated random signal is implemented in the PSpice environment with the ability to change the statistical characteristics of mean and variance, according to the study.

Random signals generation with predefined statistical properties

In practice, electric signals that have random nature can analytically be fully described by the following parameters and characteristics: average value and mathematical deviation $m_u(t)$ for voltage and $m_i(t)$ for amperage. They are basically a continuous shift of the oscillation; Dispersion or energy of the signal, Root-Mean-Square for voltage σ_u^2 and σ_i^2 for the current, that give an idea of the range of the relatively average value of the random oscillations; Distribution law for the probability $p(u)$ or $p(i)$. Due to a great number of factors that need to be taken into

Arrays and programming languages

Stoyan B. Bonev, Volin A. Karagiozov, John E. Galletly, Dimitar G. Christozov

*This article is based on the array data structure as a data container for same data type series of individual elements accessible through a collective common name and nonnegative integer index. The evolution and variety of arrays available in contemporary programming languages are presented. The paper serves as a survey on arrays. It includes comments on static arrays and dynamic arrays, stack allocated arrays and heap allocated arrays, one-dimensional arrays, multidimensional rectangular arrays, multidimensional ragged arrays, associative arrays. Fragments of numerous sample demo programs in Visual Basic, C++, C# and Java are used as illustrations. Predefined library classes for array processing **Arrays**, **Array**, and **ArrayList** are introduced with source text of sample demo programs. The paper contents is addressed to students and software developers whose area of interest and practical experience includes comparative study of programming languages, design and implementation of language processors – convertors of high level programming languages etc.*

*Масиви и езици за програмиране (Стоян Б. Бонев, Волин А. Карагъзов, Джон Е. Галетли, Димитър Г. Христозов). Статията разглежда масива като контейнер на еднотипни данни, достъпни чрез колективно име и неотрицателен цял индекс. Представен е обзор на разнобразни масиви, достъпни за работа в съвременни езици за програмиране. Описани са статични и динамични масиви, стек базирани и куп базирани масиви, едномерни масиви, многомерни правоъгълни масиви, многомерни назъбени масиви, асоциативни масиви. Фрагменти от програми на Visual Basic, C++, C# и Java са представени като илюстрация. Популярни предефинирани класове за работа с масиви **Arrays**, **Array**, и **ArrayList** са включени с подходящи примери. Статията е адресирана към читателска аудитория – студенти и софтуерни специалисти с интереси в области на познанието като сравнително изучаване на програмни езици, анализ и проектиране на езикови процесори – конвертори на езици за програмиране и други.*

I. Introduction

Data, processed within computer programs, get stored in memory either as scalar values /simple data types/ or as aggregated data structures. Using data structures for saving data permits a reference to a series of values using a collective group common name. The array is well known as a conventional data structure. It is being considered as a container of same data type individual values. All the array elements are saved in contiguous memory locations under a common name identifier, which is considered an initial base address of memory allocation. To refer to an individual array specific element one has to use an index /subscript/. The index may present as a literal constant or a named constant, or a variable, or an expression. The index type is always a non-negative integer value and does not depend on the array data type. The range of valid index values varies and depends on the actual array size.

This paper presents a variety of the arrays, supported in programming languages: one-dimensional arrays, multidimensional rectangular arrays, multidimensional ragged arrays and associative arrays. The syntax for declaring and creating an array as well as the syntax to access a separate array element are illustrated using programming languages Visual Basic, C++ native and managed code, C# and Java. The concept of static arrays, dynamic arrays, stack based arrays and heap based arrays are shortly discussed.

Well known predefined library algorithms and classes for array processing **Arrays** [2], [3], **Array** [4], [5], **ArrayList** [1], [6] are described as well.

II. Arrays classified

II.1 Static arrays

“Static array” as a term is used in two different contexts [6]:

Research of PWM pulse frequency influence on the asynchronous drives characteristics – laboratory simulator

Vasil D. Dimitrov, Emiliya A. Dimitrova

The fast development of electrical drives and control systems has set up higher requirements to research and education quality. A laboratory simulator has been designed and built on contemporary devices based on the newest technologies. It offers various possibilities to examine a frequency controlled asynchronous drive at inconstant load torque. The influence of parameters and operating modes of the inverter on the energetic drive performance can be examined. In this paper the influence of the pulse-width modulation (PWM) pulse frequency on the indicators of the regulation quality is examined: the study is directed to the main dynamic indicators (overshoot, exceedance, etc.) with transient modes as well as the accuracy and fluctuations in steady-state operation. An experimental verification of the principles of vector control on an asynchronous drive is done.

Изследване на влиянието на носещата честота на ШИМ върху характеристиките на асинхронно задвижване – лабораторен симулатор (Васил Димитров, Емилия Димитрова). Бързото развитие на електрозадвижванията и микропроцесорните системи за управление поставя по-високи изисквания към научните изследвания и качеството на обучение. Лабораторен симулатор е проектиран и изграден със съвременни устройства, базирани на най-новите технологии. Той предоставя различни възможности за изпитания на асинхронни задвижвания с честотно управление при променливо натоварване. Могат да бъдат изследвани влиянието на параметрите и режимите на работа на инвертора върху работата на задвижването и енергийните показатели. В тази статия се разглежда влиянието на носещата честота на широчинно-импулсната модулация (ШИМ) върху показателите на качеството на регулиране: изследват се основните динамични показатели при преходни режими (пререгулиране, максимално отклонение и др.) и точност на регулирането и флуктуации в установен режим. Направена е експериментална верификация на принципите на векторното управление на асинхронно задвижване.

Introduction

Contemporary electrical drives are controlled by highly efficient devices and microprocessor safety and control systems. Energy-saving asynchronous motors are introduced into many modern vehicles, positioning systems and other drives in industry. These motors have minimized dimensions and weight, higher efficiency and enhanced reliability as opposed to DC motors and older series of induction motors. For an optimized design, a compound of highly conductive materials is used in the rotor. This results in minimum rotor losses and an excellent starting and switching response. Innovative rotors create perfect conditions for motors with a high degree of efficiency.

These new generation motors are designed for operation with inverters or frequency converters with a pulse width modulation (PWM) and vector control

[1], [4], [12]. This allows smooth speed control in a wide range: from 0 to several times of the nominal. The maximum speeds are limited only by the limits for the roller bearings, critical rotor speed and rigidity of the rotating parts. This is another great advantage of asynchronous motors to DC machines. Torque control could be implemented if it is necessary. Then the motor and braking torque are controlled independently of the speed. Using of torque sensors is not obligatory.

Basic principles of the PWM

Several PWM switching strategies have been developed, aimed to achieve the highest output transfer ratio and the minimum low order harmonics (which cause undesirable effects on the motor side such as harmonic losses, torque and current ripple as well as

Genetic algorithm based optimization of Fuzzy controllers tuning in level control

Snejana Yordanova, Aneliya Georgieva

The control of level of liquids in boilers, evaporators, reactors, etc., is especially important as related to energy balance. The plant is nonlinear, inertial, with model uncertainty and difficult to model and control employing classical methods. Fuzzy logic controllers (FLCs) offer an intelligent solution to the control such plants achieving in a unified and simple way system stability, robustness and good performance. The aim of this research is to develop a procedure for optimization of the tuning of PI and PID FLCs as well as linear controllers using genetic algorithms (GAs) and to prove by comparison the improvement of the systems performance. The main results are: 1) a method for off-line multi-criteria optimization of the tuning parameters of FLCs and linear controllers with a proposed fitness function based on integral squared relative error and control action and an estimate of the maximal overshoot during the step responses in various operation points, evaluated via control system simulations; 2) application of the method for level control and 3) performance assessment of the designed systems via simulation.

Оптимизация на настройката на размити регулатори при управление на ниво чрез генетични алгоритми (Снежана Йорданова, Анелия Георгиева). Регулирането на ниво на течности в котли, изпарители, реактори и др., е актуална задача, свързана с енергийния баланс. Обектът е нелинеен, инерционен, с моделна неопределеност и трудно се моделира и управлява с класически методи. Размитите регулатори (РРи) предлагат интелигентно решение за управление на такива обекти като осигуряват по унифициран и несложен начин устойчивост, робастност и добри показатели на системата. Цел на настоящото изследване е да се разработи процедура за оптимизация на настройката на ПИ и ПИД РРи, както и на линейни регулатори на основа на генетични алгоритми (ГА) и да се покаже подобряване на показателите на системата. Основните резултати са: 1) метод за оф-лайн многокритериална оптимизация на параметрите за настройка на РР и линейни регулатори с предложен функционал на основа на интеграл от квадрата на относителните грешка и управляващо въздействие и оценка на максималното пререгулиране в преходните процеси в различни работни точки, получени при симулация на системата; 2) приложение на метода за управление на ниво и 3) оценка на показателите на синтезираните системи чрез симулация.

Introduction and state of the art

Level control is important in many installations – boilers, evaporators, reactors, etc., as it is closely related to energy balance. The plant is nonlinear, inertial, with model uncertainty and difficult to model and control by employing classical control approaches. The linear controller design is based on a linear plant model and ensures a good system performance only in a close area around the operating point for which the plant model is derived. The existing enhancements to the linear controllers such as dead zone for damping oscillations due to

discretisation and noise effects, anti-wind-up circuitry for integration, etc., introduce nonlinearity and complicate the controller tuning. The nonlinear controllers on the other side are richer in facilities but have complicated and unique for each nonlinear plant design, based also on a plant model, computationally heavy and cause system stability problems. Therefore, the popularity of fuzzy logic controllers (FLCs) as a specific class of nonlinear controllers grows now-a-days. The reason is the FLC simplicity in structure and design, the universal design approach, which is independent of plant type (presence of nonlinearity, or

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Главен редактор:

Проф. д-р Иван Ячев

Зам. гл. редактор:

Проф. д-р Стефан Табаков

Редакционна колегия:

Чл. кор. проф. д-р Георги Младенов

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Акад. Юрий Якименко, Украйна

Технически редактор: Захари Зарков

Адрес:

Пощенска кутия 98

ул. "Раковски" № 108

ет. 6, стая 606

София 1000

тел.: +359 2 987 97 67

+359 2 988 01 98

e-mail: epluse@mail.bg

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СЪДЪРЖАНИЕ

КОМУНИКАЦИОННА ТЕХНИКА

Елена Бакhtiарова

Качеството на възпроизвеждане на устна казахска реч в стохастични цифрови системи за предаване при нейното статистическо обединяване

2

Евелина Пенчева

Аспекти на проектирането на IP-базиран приложен протокол за мобилен мониторинг

6

ЕЛЕКТРОНИКА

Цветомир Лазаров

Опростена платформа за прехвърляне на данни от CMOS матричен сензор към персонален компютър

13

Радосвет Г. Арнаудов, Светозар К. Андреев

Електромагнитно изследване на влиянието на „съшиване“ чрез проходни отвори върху паралелни заземяващи равнини в многослойни платки и електронни корпуси

29

Катя Аспарухова

Използване на случайни сигнали със зададени статистически параметри за изследване на схеми в средата на PSpice

27

КОМПЮТЪРНА ТЕХНИКА

Стоян Б. Бонев, Волин А. Карагъзов, Джон Е. Галетли, Димитър Г. Христов

Масиви и езици за програмиране

31

ЕЛЕКТРИЧЕСКИ ЗАДВИЖВАНИЯ

Васил Димитров, Емилия Димитрова

Изследване на влиянието на носещата честота на ШИМ върху характеристиките на асинхронно задвижване – лабораторен симулатор

37

СИСТЕМИ ЗА УПРАВЛЕНИЕ

Снежана Йорданова, Анелия Георгиева

Оптимизация на настройката на размити регулатори при управление на ниво чрез генетични алгоритми

45

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SIELA 2014



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The aim of the symposium is to provide exchange of information and experiences on the new developments, trends and applications under industrial and academic view points in the field of electrical apparatus and technologies, as well as to stimulate personal contacts and fruitful cooperation, especially between industrial and academic institutions.

Topics

1. Study, design, field problems and optimisation.
2. Materials and technologies.
3. Low-voltage apparatus.
4. High-voltage apparatus.
5. Actuators and sensors.
6. Power electronics.
7. Transformers, electrical machines and drives.
8. Electrotechnological processes and apparatus.
9. Renewable energy and power quality.
10. Informatics, Computer Science and Communications.
11. Business and marketing.
12. Education and training.

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The working language of the symposium will be English.

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The symposium will be held in hotel Bulgaria, in the town of Burgas, situated on the coast of the Black Sea.

Deadlines

Receipt of digests	15.03.2014
Notification of acceptance	15.04.2014
Receipt of full papers	15.05.2014
Receipt of exhibition intention	15.05.2014

Address for Correspondence

SIELA 2014

Union of Electronics, Electrical Engineering and
Telecommunications (CEEC)
108, Rakovski Str.
1000 Sofia
Bulgaria

Phones: (+359 2) 987 9767 (+359 2) 965 2807
(+359 2) 965 3639

Fax: (+359 2) 987 9360 (+359 2) 986 1619
(+359 2) 962 4196

E-mail: siela@tu-sofia.bg
<http://siela.tu-sofia.bg>