

IJSCI

INTERNATIONAL JOURNAL OF SYSTEMICS, CYBERNETICS AND INFORMATICS

(April 2007)

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Abstracts

Sl.No.	Title of the paper	Abstract
01	Transient Evolution of Universe	Astro-physicists proposed various equilibrium theories about the origin and evolution of universe. To account for experimental data, theories of expanding universe are proposed. The author proposes various novel ideas related to the transient evolution of universe. Based on the speculations of earlier physicists, the author proposes various ideas related to the notion of repulsive force between mass/energy systems. This concept of repulsive force potentially provides one possible explanation for the recent experimental observations related to dark energy.
02	On a Recursive Algorithm for Analysis of Loss Probabilities in High Speed Networks under Partial Buffer Sharing Scheme	To effectively utilize network resources while still providing satisfactory Quality of Service (QoS) to all network users, prioritizing the user's traffic according to their service requirements becomes necessary in high speed networks. In this paper, partial buffer sharing (PBS) scheme controls two types of service classes: real-time and non-real-time in the queue. The performance analysis of networks carrying variable bit rate traffic mainly depends on the consecutive packet loss. We propose a recursive algorithm to calculate loss probabilities for block of consecutive non-real-time packets. Further the effect of different threshold values on packet loss probabilities is examined.
03	Use of Wavelets in End Point Detection and Denoising Under Low SNR Constraints	This paper discusses the end point detection for the speech in the presence of noise with high spectral energy. It is found that end point detection using short-time energy, zero crossing rate and spectral entropy based methods becomes difficult and inaccurate when the speech is recorded in the presence of noise or speech is combined with noise. In this paper modified wavelet entropy is obtained by computing the modified probability density function for the speech segments of 20 msec duration. Since wavelet transform coefficients in the required frequency band are used to determine end points, this method proves to be successful even if the superimposed noise energy is greater than the speech energy. Subjective and experimental results reveal the performance of our proposed algorithm in high frequency noise elimination in addition to end point detection.
04	Polyphase Sequences with Good Correlation Properties	Sequences having the minimum peak aperiodic autocorrelation sidelobe level one (1) are called Barker Sequences. Such sequences have been used in numerous real-world applications such as channel estimation, radar and spread spectrum communication etc. Unfortunately, the longest known biphasic and quadriphasic Barker sequences are of lengths 13 and 15 respectively. In this paper Modified Simulated Annealing Algorithm (MSAA) is used to design thirty-two phase sequences, which have good autocorrelation properties. Some of the synthesized results are presented here. The properties of the sequences up to length 21 have Barker properties. The sequences of lengths from 22 to 500 have good correlation properties. The synthesized 32-phase sequence sets are promising for practical application to radar and spread spectrum communication systems. The convergence rate of the MSAA is also good.
05	A Novel Cross Layer Framework for Performance Improvement in MANET	Mobile Ad-hoc Network (MANET) of energy constrained portable wireless devices is an infrastructure less network where routing, medium access and signal transmission are critical. The Ad-hoc On-demand Distance Vector (AODV) routing protocol uses shortest path as metric. The Distributed Co-ordination Function (DCF) of IEEE 802.11 WLAN standard supports medium access in ad-hoc operation through Carrier Sense Multiple Access with Collision Avoidance (CSMA / CA) mechanism which employs RTS/CTS exchange prior to data packet transmission. The power used for MAC layer packet transmissions decides the floor area (transmission range) acquired by wireless devices which in turn affects interference level and network performance. In this paper, we propose a cross layer design with interaction among PHY-MAC- Network layers to employ transmission power control to all MAC layer packets based on the received signal strength of Route Reply Packet (RREP) of route discovery mechanism of the routing protocol. This cross layer framework for power controlled medium access is implemented using Global Mobile Simulator (GloMoSim) and energy conservation is obtained. This study to improve the performance of MANET stresses the need for collision reduction mechanism to boost quality of service (QoS) in heterogeneous environment.

- 06 Color Image Segmentation Using Wavelet Transform
- Image segmentation involves partitioning an image into the set of homogeneous and meaningful regions such that pixels in each partitioned region have an identical property or attributes. A novel wavelet transform based technique called "color image segmentation using wavelet transform (CISWT)" is proposed. One of the potential advantages of wavelet transform is that it provides a precise and unifying framework for the analysis and characterization of a signal at different scale. Also, the low pass and high pass filters used in wavelet transform remains same between two consecutive scales. CISWT utilizes the *perceptually uniform* color space for segmentation. To increase the speed of segmentation algorithm and reduce the computational complexity for clustering, prominent pixels are selected. One level decomposition of wavelet transform is used. *LL1* sub band of decomposition is utilized for clustering. Fuzzy c means (FCM) clustering technique is used to locate clusters and their labels. Fuzzy entropy is used to decide number of clusters. The image pixels are classified to respective clusters based on minimum euclidian distance. A post processing noise filtering stage is applied to improve the segmentation output. One of the advantages of this method is that it does not need to specify a *priori* information to segment a color region besides; there is no apparently distortion or color change after segmentation. An application of the proposed method is presented. CISWT is compared with other clustering techniques. Encouraging empirical performance of the proposed method has been demonstrated.
- 07 VLSI Based High Speed Karatsuba Multiplier for Cryptographic Applications Using Vedic Mathematics
- Public key cryptographic system consist of raising elements of some group such as $GF(2^n)$, Z/NZ or elliptic curves, to large powers and reducing the result modulo some given element. This operation is called modular exponentiation, and is commonly used in scrambling and several public key cryptosystems. Modular exponentiation involves repeated modular multiplication. The efficiency and hence the utility of a cryptosystem depends fully on the speed of this modular multiplication. Many modular multiplication methods have been proposed out of which Karatsuba – Ofman Algorithm is considered one of the fastest ways to multiply long integers, based on a divide and conquer strategy. This paper proposes techniques to increase the speed of this high-speed algorithm almost double fold, thus improving the efficiency of the public key cryptosystem manifold. It is done using the Ancient Indian Vedic Mathematics, which was rediscovered from the Vedas by Sri Bharati Krishna Thirthaji Maharaj (1884 – 1960), who was also the former Shankaracharya of Puri.
- 08 Graphical Interpretation of the RATG System for Optimal Test case Generation
- Testing is a critical activity since a single fault can cripple a whole system and result in great loss. Bugs in computer hardware and software are no more than the crystallization in silicon and plastic of the mental mistakes all people make. People are only human, after all so computers can only reflect our own humanity. Testing is expensive. It often consumes between 1/3 to 1/2 of the total cost of software development. Let us remember the Year 2000 problem. The total cost world-wide of changing and testing the relevant software was estimated to be 400 billion dollars [1]. Testers face the challenge of doing testing within the constrained schedule. In the hyper competitive commercial market place, it is not practical to exhaustively test all combinations of system test cases. The number of ways a system must be tested can often be overwhelming. There are a number of automatic test case generation tools available but these can suffer from combinatorial explosions in the number of possibilities to test. The combinatorial approach to software testing uses models to generate an optimal number of test inputs so that selected combinations of input values are covered. The most common coverage criterion is two-way, or pair-wise coverage of value combinations, though for higher confidence three-way or higher coverage may be required. This system presents examples of requirements and related models for applying the combinatorial approach to those requirements. The paradigm of model-based testing shifts the focus of testing from writing individual test cases to developing a model from which a test suite can be generated automatically. As the Complexity of generating the test cases is directly dependent on various applications and which in turn depends on number of parameters and number of values. This arises a need to formulate a new tool which is capable of identifying the optimal required number of test cases with good coverage. This leads to the development of the RATG system (Reduced Automated Test case Generator). The RATG System generates a small subset of test cases which provides a good coverage of test domain using combinatorial design. The importance of the RATG system will be noticed when the number of parameters increases.
- 09 Electronic Counter Support Measures (ECSM) – An Introduction
- Radar is the key sensor of any modern weapon system. Its capability to function in all weather environments at long ranges is unmatched with any other available sensor. Land based radars are used for variety of tasks ranging upward in size and complexity from man portable radars for detection of vehicle and personnel to ballistic missile tracking phased arrays. Increased reliance on radars, communication systems, speed of missile and weapon system and high speed detection and tracking has increased the importance of Electronic Warfare (EW). Electronic warfare is subdivided into Electronic Support Measure (ESM), Electronic Counter Measure (ECM) and Electronic Counter Counter Measure (ECCM) systems. This paper deals with the ESM which is the division of electronic warfare involving action taken to search for intercept, identify and locate sources of radiated electromagnetic energy from radar for the purpose of threat recognition.

- The performance of a complex industrial process like steel rolling mill requires integrating various approaches like diagnosis, control, optimization methods etc. These techniques can be grouped under the term intelligent control to improve the operating environment and quality of the delivered product. Most of the industrial applications are of nonlinear. Fuzzy Logic Controller is the most useful approach to achieve the adaptive ness in the case of nonlinear system. Since Fuzzy logic control provides systematic method of incorporating human expertise and implementing non-linear system. Neural Networks are integrated with fuzzy logic which forms a Neuro Fuzzy System (NFS). Neuro fuzzy computing enables one to get more intelligent decision making system for a process. Here the fuzzy systems augmented by neural networks to enhance the some of its characteristics like flexibility, speed and adaptability. The design consists of designing neural networks to implement fuzzy logic and fuzzy decision making and to realize fuzzy membership functions. This paper demonstrates the effectiveness of NFS in optimizing the strip loop height in steel rolling mills compared with Conventional controllers, FLC. The simulation result depicts that NFS quickly restore the speed of the main drive and hence loop height is quickly reduced to its optimal value which intern ensures the safety working condition of steel rolling mills.
- 10 A Neuro-Fuzzy Model for Controlling Strip Loop Formation in Hot Steel Rolling Mills
- In the present paper, a CMOS operational amplifier has been designed using latest technology of 0.5 μm for the application in bandgap voltage reference to obtain a very stable voltage reference. A technique has been presented at 0.5 μm technology which maintains very little dependency of bandgap voltage reference upon temperature and power supply. The bandgap reference could be generated references having a temperature coefficient of the order of 10 ppm/ $^{\circ}\text{C}$ over the temperature range of 0 $^{\circ}\text{C}$ to 70 $^{\circ}\text{C}$. For temperature coefficient TC = 1.95 ppm/K an extended temperature range is 273K<T<363K. Further, the circuit was simulated and analysed using commercially available analog CADENCE design tools and a close agreement was found for the target parameters, namely reduced chip area, simpler design, low power dissipation and high sensitivity .
- 11 Design and Development of CMOS Bandgap Voltage Reference Circuit in VLSI
- Programmable Logic Controller (PLC) is a typical Microprocessor or Micro-Controller based system with its dedicated operating system to interpret the ladder diagram, scan inputs and activate the final control elements. As the number of rungs of the ladder diagram increases the time taken by the PLC also increases. This happens because the ladder diagram is converted into ladder instruction that the operating systems can understand. Converting the given ladder diagram to a ladder instruction is done by a processor specific tool. Typically all PLC's use Microprocessor or Micro- Controller and their developing tools, as they were easily available in the market along with their development tools. As ladder complexity increases, the PLC starts loosing its real time control capabilities. In this paper we approach the ladder diagram to be equivalent to a gate and flip-flop based logic. This makes Field Programmable Gate Array (FPGA) the best choice for developing redundant PLC. The paper closely discusses the use of FPGA to support the implementation of such logic inside them along with how advancements in VLSI design tools is making it possible to develop a single chip PLC. The software required for the development of ladder and the conversion of the ladder to Hardware Description Language (HDL) and its implementation are also developed. In this paper we realize a compiler that accepts ladder and converts directly to Very High Speed Integrated Circuit Hardware Description Language (VHDL). This allows the end user to select FPGA of his choice by any vendor for final implementation, thus breaking the monopoly of the PLC manufacturers. There is also a modification possible in existing FPGA architectures to accommodate control logic in a more effective manner for application specific processor.
- 12 An Affordable Methodology for the Design and Implementation of a PLC on a Single Chip FPGA
- Symbolic Computing – Signal and Image Processing (Lecture Series–6) - Special Automata for Normal Algorithms and their Transcriptions
- 13 In this section, we shall interpret signals as variable length codes over alphabet and normal algorithms as special automata, and briefly demonstrate a syntactic method of implementing signal processing operations by means of a system of such automata of appropriate normal algorithms. There are occasions when it becomes necessary to encode the schemes of certain normal algorithms such that their coded forms become amenable to some other normal algorithms. Hence, we shall treat a constructive signal processing system either as a code or as an automaton depending on the requirement.