

M.TECH. THESIS ABSTRACT 1994

Sr No	Area	Page No
1	Microelectronics, VLSI & Technology Display	7-7
2	Signalprocessing, Communications & Networks	8-22
3	RF Microwaves & Photonics	23-27
4	Power & Control	28-38

Microelectronics, VLSI & Display Technology

Sr No	Title	Supervisor	Page No
1	A Theory For Regenerative Supervision Of Discrete Event Processes	Raina Ajay K	7

Signal processing, Communication & Networks

Sr No	Title	Supervisor	Page No
1	Real-Time Implementation Of Factorization Theoretic Feed Back Controller Using Adsp-2100	SuleVirendra Ramakant	8
2	Design Of A Multiplexer Demultiplexer For Isdn Primary Access Subscriber Loop	Srivathsan K R	9
3	On Elliptic Curve Cryptosystems	SiddiquiM U	10
4	Pre-Implementation Studies Of Teleconferencing In A Multimedia Environment	Srivathsan K R & Sinha Vishwanath	11
5	Control System Design : Tackling Uncertainty With QFT	Sule Virendra Ramakant	12
6	Detection, Estimation And Classification Of Transients Using The Wavelet Transform	Gupta Sumana	13
7	Development Of A Fieldbus Compatible Remote Data Acquisition And Controller System	Srivathsan K R & Joshi Avinash	14
8	Speech Signal Modelling By A Sum Of Complex Fm Signals	Sircar Pradip	15
9	Handwritten Devgagari Script Recognition Using Neural Networks	Mullick S K	16
10	Image Restoration Using Wavelet Decomposition	MullickS K	17
11	Detection Of Motion Using The Wavelet Transform	GuptaSumana	18
12	On The Strategy Of Nonuniform Sampling	Sircar Pradip	19

13	R-S Code Based Error Control Coding Scheme For Teletext Systems	SiddiquiM U	20
14	A Novel Color TV System Based On Spiral Sampling Of U-V Plane	Mullick S K& Gupta Sumana	21
15	Implementation Of Multicast Backbone On IITK Campus LAN	SrivathsanK R	22

RF Engineering & photonics

Sr No	Title	Supervisor	Page No
1	Performance Evaluation of a Linear Array in Low Level Image and Signal Processing Application	Mahanta Anil	23
2	Design Of ADSP 2100-Based Multiprocessor Array	Mahanta Anil & Moona Rajat	24
3	Study Of Suspended Stripline Excited Dielectric Rod Radiator	Sachidananda M	25
4	Experimental Study Of Stripline-Fed Slot Radiators For Array Applications	Sachidananda M	26
5	Full Wave Analysis Of Single And Coupled Shielded Image Guide For Millimeter Wave Applications	Biswas Animesh	27

Power & Control

Sr No	Title	Supervisor	Page No
1	Comparison Of Fast Decoupled Load Flow Methods And Its Application To Static State Estimation	Kalra Prem Kumar & Srivastava S C	28
2	Fast Decoupled Load Flow Based Voltage Contingency Selection Method	Kalra Prem Kumar & Srivastava S C	29
3	VLSI Implementation Of CMOS Neutron And Associate Memory	Hasan Mohammad Mozaffarul	30
4	Dc-Ac Power Converter With High-Frequency Link	Dubey G K	31
5	Design Of A High Speed CMOS VLSI Floating Point Arithmetic Processor	Hasan Mohammad Mozaffarul	32
6	An Investigation On Effect Of Pre-Ionization On The Lightning Air Terminal	Arora Ravindra	33
7	An Investigation Of The Schwaiger Factor Limit In Air	Arora Ravindra	34
8	Analysis Simulation Design And Implementation Of Lcc Resonant Dc To Dc Converter	Doradla S R	35
9	Digital Computation Of Continuous Current Carrying Capacity Of Cables	Arora Ravindra	36
10	Design And Study Of Model Reference Adaptive Pss And Svc Stabilizers For Dynamic Stability	Prabhu S S & Sachchidanand	37
11	A Software Package For SCB With Applications To LTR	Hole K E	38

Title : *A Theory For Regenerative Supervision Of Discrete Event Processes*
Author(s) : *Valavi Anand*
Roll No : *9210444*
Supervisor(s) : *Raina Ajay K*

Abstract

We investigate the non-terminating behavior (NTB) of discrete event processes (DEP). Processes that are discrete, asynchronous and possibly non-deterministic. The finite behavior of a DEP was modeled by Wonham and Ramadge (Automata Modal) as the generator of a formal language, while the controller or supervisor was constructed from the grammar of the specified target language that incorporates the desired closed loop system behavior. Subsequently, the sequential (infinite-time) extension of this theory was done by Ramadge using Buchi automata models. We define a regenerative supervisor as one that guarantees infinite visits to a pre-specified state subset. A non-blocking supervisor is one which ensures that all finite behavior of the supervised system leads to some NTB. We give a necessary and sufficient condition for the existence of a supervisor that is both non-blocking and regenerative. We then give a synthesis method to obtain the best (minimally restrictive) non-blocking, regenerative supervisor for a given DEP. The trace Model of DEPs, based on Hoare's model of sequential process, was suggested by Smedinga. Such models define a larger class of DEPs than the automata mode. In the TM, finite behavior of a DEP is modeled as a set of event traces. The manner in which control is incorporated into this model complements the notion of control blended into the automata modal. We show that the synthesis method (slightly modified) is valid for the trace model as well. The synthesis method can also be used if acceptable NTB is defined in terms of the occurrence of some pre-defined events infinitely often. The structure of the supervisor obtained using the synthesis method given here, and the decomposition of the state set into "controllable" and "uncontrollable" state subsets has interesting parallels in "traditional" state space control theory for dynamic systems modeled using differential equations.

For more details click here

back

Title : *Real-Time Implementation Of Factorization Theoretic Feed Back Controller Using ADSP-2100*
Author(s) : *Kulkarni Vaishali*
Roll No : *9210443*
Supervisor(s) : *Sule Virendra Ramakant*

Abstract

Factorization theory is a very powerful approach for multivariable control system design, with which the solutions to seemingly difficult and extremely important control synthesis problem can be characterized. One such important feature of this theory is the stabilization problem. The controller which would stabilize the plant is of the form $C(F, R)$ where F is the fixed part depending on the plant and R is the free part which could be any stable transfer function with $|R| < 1$ for some closed loop performance in addition. The structure itself suggests a computational algorithm and could be implemented using presently available hardware. ADSP - 2100 is a 16 - bit processor form analog devices which is used for the implementation purpose. The aim is to test the practical feasibility of such feedback controllers

For more details click here

back

Title : ***Design Of A Multiplexer Demultiplexer For Isdn Primary Access Subscriber Loop***

Author(s) : ***Mohanty Sujata***

Roll No : ***9710439***

Supervisor(s) : ***Srivathsan K R***

Abstract

The Integrated Services Digital Networks (ISDN) envisages supporting several types of switched customer services through digital subscriber loops from the local telephone exchange to subscriber premises. The ISDN standards support two types of subscriber loops: Basic Access at 144 kbps and Primary Access at 1.544 Mbps or 2.048 Mbps. The future ISDN Telecom Network is in principle capable of switching subunits of the Primary access (i.e. each of the 30 B channels of 64 kbps each) independently and also a 64 kbps packet switched signalling channel. Such a sophisticated subscriber access at primary rate requires a flexible Network Termination (NT) unit at customer premises. A part of this NT is a Multiplexer/Demultiplexer unit. In this thesis, after a review of ISDN subscriber loops, the design of Multiplexer/Demultiplexer is carried out. This unit is based on a dual bus modular architecture. One bus supports micro processor compatible STE bus and the other provides timing signals for multiplexing and demultiplexing. The two crucial functions: to generate an outgoing multiplexed 2.048 Mbps (Subscriber premises to NT) and demultiplex the incoming 2.048 Mbps (from NT to subscriber premises) have been carried out. Two application specific customer interfaces for voice and data have been developed. All modules are controlled by an STE bus microprocessor card.

For more details click here

back

Title : *On Elliptic Curve Cryptosystems*
Author(s) : *Kuppuswamy Kalyan*
Roll No : *9210418*
Supervisor(s) : *Siddiqui M U*

Abstract

The traditional cryptographic schemes used for public - key systems like pohlig -hellman, El gamal, massey -omura, etc. based on finite fields are being seriously threatened due to recent advances in solving the discrete logarithm problem over finite fields. Also newer and faster methods of factoring integers (upto 100 digits) have made schemes like rivest, shamir and adleman (RSA) based on finite rings, vulnerable to such attacks. Against this background, efforts are on to base the existing cryptographic schemes over more general structures, notably the elliptic curve groups and matrix ring groups, over which such attacks may become inoperative. In this thesis, we look into the theory aspects of the elliptic curve algebra, try to adapt the existing public - key cryptographic schemes like pohlig -hellman, etc. on elliptic curve groups and more importantly from the practical viewpoint, discuss the various key implementation aspects like computational complexity, faster encryption, etc. that arise with these modified cryptosystems. Also a new general -isation i.e cryptosystems based over monoids is carried out for elliptic curves based over finite rings which is the elliptic curve equivalent of the RSA scheme. The entire discussion is written in a tutorial format and examples (simulated using C language source code) have been profusely quoted to illustrate the theory aspects

For more details click here

back

Title : *Pre-Implementation Studies Of Teleconferencing In A
Multimedia Environment*
Author(s) : *Shivakumar S M*
Roll No : *9210452*
Supervisor(s) : *Srivathsan K R&Sinha Vishwanath*

Abstract

This thesis presents a study and a brief system design of a Video Conferencing system. The associated video coding standards have been studied in detail and they have been included in the thesis as appendices. The thesis also reviews the evolution of Video Conferencing systems. An overview of multimedia applications, and the complex demands and concepts to communications associated with these multimedia applications is also presented. A totally different approach to video conferencing based on the multimedia environment is introduced. A multimedia mailing software known as METAMAIL has been installed on an experimental basis and trials conducted.

For more details click here

back

Title : *Control System Design : Tackling Uncertainty With QFT*
Author(s) : *Venkatarao Ryali*
Roll No : *9120410*
Supervisor(s) : *SuleVirendra Ramakant*

Abstract

Computer –aided control system design, using quantitative feedback theory (QFT), for continuous time, linear time invariant, single-input single-output, systems with parametric uncertainty, has been tackled in this thesis. The general parametric uncertainty model assumed here involves a transfer function with its coefficients given as polynomials over a set of system parameters, varying in a real hyper-rectangle. A modified QFT algorithm, based on the extremal, rather than, as is done traditionally, the entire, system frequency response, has been implemented here. The attendant frequency response extrema computation is based, for the general polynomial uncertainty case, on a uniform grid search scheme. For a special case of systems with polynomial uncertainty, viz. the linear affine uncertainty systems, the extremisation is based on a frequency response-mapping theorem. This results in a computationally efficient algorithm, relative to the grid method, for the linear affine uncertainty case. The consequent improvement in the computational aspects and the ease of applicability of the basic QTF design paradigm, achieved using the modified QTF algorithm, relative to the traditional QTF approach, is demonstrated through the solving of five design examples

For more details click here

back

Title : *Detection, Estimation And Classification Of Transients
Using The Wavelet Transform*
Author(s) : *Patil M D*
Roll No : *9210449*
Supervisor(s) : *Gupta Sumana*

Abstract

In this thesis, a new methodology for detection and estimation of transients in the presence of noise is presented. The transients considered are non - stationary and wideband in nature and are not well handled by classical Fourier techniques. The proposed technique uses wavelet transform and does not require a priori knowledge of the nature of signal or noise. The basis function used, is the compactly supported Daubechies wavelet with eight vanishing moments. The detection and estimation is followed by feature extraction for identification of the source of transients. The energy in different levels of the wavelet transform of the detected data forms the feature vector. This is compared with stored reference feature vectors in terms of closest neighbourhood criterion. This technique is computationally fast and can be implemented in real time

For more details click here

back

Title : ***Development Of A Fieldbus Compatible Remote Data Acquisition And Controller System***
Author(s) : ***Gaiwak Apurva***
Roll No : ***9210410***
Supervisor(s) : ***Srivathsan K R&Joshi Avinash***

Abstract

With increasing sophistication in supervisory control and data acquisition systems (SCADA), used to monitor and control process plants, cost effective and versatile industrial networks have become a necessary part of industry. Until now networks supplied by leading process control equipment manufacturers have provided proprietary solution for industrial automation. Recently leading standards bodies such as Instrument Society of America, International Electrotechnical Commission and International Standards Organization have taken efforts to provide a set of open standards called fieldbus for the evolution and growth of future industrial networks. In this thesis, a brief overview of some well known proprietary industrial networks of leading industrial automation equipment vendors is presented. This is followed by a summary of the current draft proposal of Fieldbus standards. An architecture for a microcontroller based Remote Transmission Unit, which can be used for a networkable remote SCADA field unit is suggested. Based on this a remote transmission unit, using 68HC11E9 microcontroller, has been designed and tested

For more details click here

back

Title : *Speech Signal Modelling By A Sum Of Complex Fm Signals*
Author(s) : *Sharma Sanjay*
Roll No : *9210453*
Supervisor(s) : *Sircar Pradip*

Abstract

In this thesis, a new model is suggested for modelling signal data from a deterministic or stochastic process. The signal data is modelled as sum of several complex Frequency Modulated Signal. Autoregressive model based on Burg algorithm is used for estimation of model coefficients. These coefficients are used to find the power spectral density. From this the FM subsignals, carrier and Modulating Frequencies are estimated. Use of discrete Fourier Transform is made of in estimating the subsignals Modulation Index. Separation of individual subsignal before estimation of Modulation Index is also discussed. These estimated parameters are then used in estimation of subsignals amplitude and Phase. The model is first fitted on a synthesized data. The model is then fitted on speech signal with varying degree of success

For more details click here

back

Title : *Handwritten Devgari Script Recognition Using Neural Networks*
Author(s) : *Sant Jeetendra C*
Roll No : *9210415*
Supervisor(s) : *MullickS K*

Abstract

In this thesis, experimentation on 27 characters in Devnagari Script was carried out. This large number necessitates the use of very large feed - forward neural networks. It is extremely difficult to find the right size network (the number of hidden layer nodes). For this reason, Classification Tree with Neural Network Feature Extraction method (CTNNFE) is used, which provides a structured approach to the design of Neural Network classifiers. In contrast to the linear or single coordinate features used in the conventional CART method, nonlinear features are extracted in CTNNFE using a MultiLayer Perceptron at the decision node of a tree. Nonlinear features extracted by the MLP have a much greater pattern separating capability and hence, the method leads to reduced error rates. CTNNFE algorithms and a single MultiLayer Net are compared on the handwritten Devnagari character recognition problem. It is shown that the CTNNFE algorithm yields better error rates and shorter training times than a single MLP trained with back-propagation

For more details click here

back

Title : *Image Restoration Using Wavelet Decomposition*
Author(s) : *Motwani Ravi*
Roll No : *9210424*
Supervisor(s) : *Mullick S K*

Abstract

In this thesis, an algorithm for image restoration using the regularization method has been introduced. The development of this algorithm is based on Tikhonov Regularization method for obtaining a solution to an ill - posed problem. The image Restoration Problem is an ill -posed problem. Some constraints are required to eliminate the unwanted solutions. There are various ways in which these constraints are imposed to try to arrive at a unique solution. Wavelets have not been used before in the regularization method used to solve the problem of Image Restoration. In this thesis the wavelet approach to the problem of image restoration is described. Infact, the wavelet approach can be applied to any linear inverse problem in Image Processing. For most of the linear inverse problems in image processing the wavelet approach reduces the condition number of the problem. In this approach, the images and the operator to be inverted are represented by the wavelet basis and various constraints for a regularized solution are enforced by simply scaling the projected components of the signal.

For more details click here

back

Title : *Detection Of Motion Using The Wavelet Transform*
Author(s) : *SharmaDeepak*
Roll No : *9210448*
Supervisor(s) : *Gupta Sumana*

Abstract

A method for the detection and estimation of motion in image sequences is presented. In order to estimate motion parameters reliably, a gradient based spatiotemporal constrain equation for motion estimation using zero crossings of wavelet transform is desc ribed. Multiresolution image decomposition is performed with the biorthogonal wavelet transform and motion parameters are hierarchically estimated. Motion vectors are also estimated using laplacian of Gaussian smoothing filter, using the same constrain equ ation. Finally a performance comparision of the two methods are carried out using the synthetic and laboratory image sequences respectively

For more details click here

back

Title : *On The Strategy Of Nonuniform Sampling*
Author(s) : *Basu R*
Roll No : *9210430*
Supervisor(s) : *Sircar Pradip*

Abstract

A nonuniform sampling strategy based on the estimation of local bandwidth, has been proposed in this thesis work. For the off line method AR - PSD technique has been used for determining the local bandwidth. Newton's Divided Difference method has been used for the on line estimation of local bandwidth. Orthogonal Polynomial Approximation method has been used for the reconstruction of the signal from its sample points. To study the performance the proposed sampling strategy has been applied to four different types of signals. It has been found to be more efficient than the equivalent uniform technique for a wide variety of signals which are essentially non stationary in nature

For more details click here

back

Title : *R-S Code Based Error Control Coding Scheme For Teletext Systems*
Author(s) : *Kumar Anjani*
Roll No : *9210407*
Supervisor(s) : *Siddiqui M U*

Abstract

Teletext is a fast developing information service because of low infrastructure requirements as it uses the already existing television broadcasting network. In the basic teletext, error protection has been provided to the header, prefix, and control bytes using single error correcting (8,4) Hamming code but the data bytes are transmitted without error correction coding. The enhanced features proposed to be incorporated into teletext require the data to be protected from errors. Moreover with enhanced features, unacceptable delay is introduced in case when data lines are missing. In this thesis, a single error correcting code based on Reed - Solomon code has been proposed and its performance analysed based on bit error rates of 10^{-3} and 10^{-4} . Both the cases of transparent and non-transparent data have been considered. The product form of these codes namely the single bundle and double bundle have been proposed which are capable of replacing one and two missing lines in a page respectively. The schemes proposed have been implemented using C language source code

For more details click here

back

Title : *A Novel Color TV System Based On Spiral Sampling Of U-V Plane*
Author(s) : *Ilangovan A*
Roll No : *9210404*
Supervisor(s) : *Mullick S K&Gupta Sumana*

Abstract

The redundant color information for the eye, in the existing method of color representation for Video/Television system, is identified. The peculiarities of the color plane (spanned by U and V signals) are studied in depth, and the two signals are combined into single signals by spiral scanning approximation, which is similar to 2 - D quantization. The “Bandwidth” and the “Color signal approximation noise ratio” are derived for the new signals. For ameliorating the noise problems, squaring and scrambling operations are also developed. The experiments prove the validity of such an approximation, with very few encirclements (6) of the spiral. While band limiting the new signal, the quality deteriorates considerably. To improve matters, the spiral is made to vary along Y - the luminance axis, according to the varying nature of color gamut. Better scrambler also be developed and the net result is a reasonable quality of images with single chroma signal and luminance signal (Y). For the purpose of data transmission, the new signal requires only 5 bits for quantization to provide excellent quality, whereas the original two signals (U and V) required totally 8 bits (4 bits each).

For more details click here

back

Title : *Implementation Of Multicast Backbone On IITK Campus LAN*
Author(s) : *SuleSandhya V*
Roll No : *9210438*
Supervisor(s) : *Srivathsan K R*

Abstract

Applications such as multi - media multi - source information services, desk - top conferencing, joint editing and preparation of documents etc. allow users of a network to participate in co - operative work across the network, these applications require the under lying network to provide group communication features such as multicast addressing and group management. Further, to use the available network bandwidth efficiently, it is essential that the multicast routing algorithms produce low - delay routes. In this pr oject, the implementation aspects of providing group communication support have been studied. The IETF - MBONE experiment has been emulated to set up a virtual network over parts of the IIT Kanpur campus LAN. This virtual network forms an IP multicasting bac kbone (MBONE) to route multicast packets among hosts on different subnets in the network. Three machines on three different subnets in the Campus network have been configured as multicast routers. These routers route multicast packets to /from hosts on the se three subnets. These machines also provide operating system support for sending and receiving IP multicast packets. Two additional machines have been configured to support only sending of multicast packets. For configuration of MBONE, public domain soft ware available over the Internet has been customized for the Campus network. The proper functioning of the campus multicast backbone has been demonstrated using a public domain software which initiates and manages multicast sessions

For more details click here

back

Title : *Performance Evaluation of a Linear Array in Low Level Image and Signal Processing Application*
Author(s) : *BaishaySrimanta*
Roll No : *null*
Supervisor(s) : *MahantaAnil*

Abstract

In this thesis, a one dimensional array architecture using ADSP-21020 DSP chips as processing elements (PE) has been proposed and its performance in low-level image and signal processing algorithms has been investigated. The architecture has one broadcast channel which is used by the host (PC-AT) for down/up-loading of program and data. The other channels have been provided for inter-processor communications which can also be used by the host for systolically passing input data as well as partial/final results. Inclusion of extra hardware has endowed the array with single-cycle multiple -destination data transfer capabilities - not provided by the DSP chip. This has enabled the architecture to match the communication bandwidth with the computational bandwidth of the PEs. The performance of the array in some low level image processing and common signal processing algorithms has been evaluated in terms of speed up factor using the simulator. Single-cycle multifunction instruction capability of ADSP-21020 along with the enhanced communication bandwidth, and concurrent I/O and computation features have resulted in efficient implementation of many algorithms. Simulation studies have revealed that asymptotically linear speed up factor is achieved in most algorithms.IU

For more details click here

back

Title : *Design Of Adsp 2100-Based Multiprocessor Array*
Author(s) : *Beg Mirza Mohammad Sufyan*
Roll No : *9210423*
Supervisor(s) : *MahantaAnil& Moona Rajat*

Abstract

The real-time signal and image processing applications make the parallel processing architectures inevitable. Here a one-dimensional multiprocessor array architecture using ADSP 2100 DSP chips as processing elements (PES) is proposed and designed. The processor array is interfaced to PC-AT. There is a broadcast channel which is used for down/up-loading of program and data to the PEs. Other two channels have been provided for interprocessor communication. One of them, namely X-channel, is also used for systematically passing input data to the PEs. Additional hardware has been included to facilitate the array with single-cycle multiple-destination data transfer capabilities - the facility lacked by DSP chips. This facility enables the matching of communication bandwidth to the computational throughput of the processor. The design has been accomplished up to the PCB level, part of the system has been assembled and partial testing has also been carried out

For more details click here

back

Title : *Study Of Suspended Stripline Excited Dielectric Rod Radiator*
Author(s) : *Kaul Rakesh*
Roll No : *9210450*
Supervisor(s) : *Sachidananda M*

Abstract

The characteristics of a Dielectric Rod Antenna, excited by a Suspended StripLine (SSL) are studied experimentally. Different parameters are considered, such as the length of the dielectric rod, the effect of shaping the dielectric rod and finally the effect of shorting out the side radiations. And approximate analysis using Green's function has been presented. The study aimed at characteristics the antenna , in terms of its physical dimensions, for array applications. The SSL due to its planar structure was used for the feeding arrangement.

For more details click here

back

Title : *Experimental Study Of Stripline-Fed Slot Radiators For Array Applications*
Author(s) : *Govila Sanjeev*
Roll No : *9210451*
Supervisor(s) : *Sachidananda M*

Abstract

In the thesis, an attempt has been made to fabricate and experimentally study two structures in stripline -fed slot arrays for suppression of parallel plate guide mode. The two structures, namely, cavity - backed stripline - fed slot and stripline - fed slot pair have been proposed, fabricated, tested and their various characteristic curves have been plotted and experimentally studied to forward meaningful conclusions and suggestions for further work.

For more details click here

back

Title : *Full Wave Analysis Of Single And Coupled Shielded Image Guide For Millimeter Wave Applications*
Author(s) : *Pradhan Lalat K*
Roll No : *9210420*
Supervisor(s) : *Biswas Animesh*

Abstract

Rigorous mode -matching technique is applied for full wave analysis of a single, symmetric coupled and asymmetric coupled shielded dielectric image guide for application in millimeter wave and optical integrated circuits. The influence of metallic shielding on the computed normalized phase constant of the dielectric image guide is investigated and also the number of field modes affecting for computing the accurate propagation constant of image guide is studied. The even and odd mode propagation characteristics of a symmetric coupled image guide is computed for three higher order modes which can be used for possible coupler and filter design. For designing of various broadband passive circuits [19] a generalized asymmetric coupled shielded dielectric image guide is analyzed in detail for c - and pi- mode propagation characteristics as a function of various structural parameters. An attempt also is made to formulate the characteristic impedance of shielded dielectric image guide for different modes of propagations

For more details click here

back

Title : ***Comparison Of Fast Decoupled Load Flow Methods And Its Application To Static State Estimation***
Author(s) : ***Gangolli Gurunandan***
Roll No : ***null***
Supervisor(s) : ***Kalra Prem Kumar &Srivastava S C***

Abstract

The energy control center is the nodal agency which controls the power system network. The load flow solution program is run to determine the power flow in the network. The input to this algorithm is the measured data telemetered from field and may get corrupted due to various reasons. Hence, the state estimator program is used to estimate the state of the network. Thus, the load flow and state estimation are two sub problems of power system network. In this work, the performance of various load flow and state estimator algorithms are critically compared in well and ill - conditioned cases. The standard fast decoupled load flow in polar coordinates using Stott's as well as amerongen's assumptions are compared with the FDLF methods in rectangular and two new algorithm in hybrid coordinates. The literature survey shows that orthogonalization by givens rotation has been applied to the state estimation using normal equations. Past decoupled state estimator by normal equations method using the same assumptions of Stott as well as Amerongen is compared with the normal equations using orthogonalization. A comparative study of all the FDLF and the various state estimator methods has been done in this thesis with reference to computation time and number of iterations for both normal and ill - conditioned cases.

For more details click here

back

Title : ***Fast Decoupled Load Flow Based Voltage Contingency Selection Method***
Author(s) : ***Nathan Vinod***
Roll No : ***9211509***
Supervisor(s) : ***Kalra Prem Kumar***

Abstract

This thesis is addressed to the development of fast and efficient methods for voltage contingency selection. One of the problems faced in the real time execution of security analysis, is the non availability of fast and accurate methods for predicting the post outage conditions. Hence , in this thesis a method has b&m'i attempted to suggest a distribution factor to predict post outage voltage . A method to predict the post outage generation has also been suggested. It has also been attempted to rank the contingencies according to their severity based on the proposed distribution factor method. An attempt has te&z=?n made to eliminate masking during contingency linking by the proposed distribution factor method by ' selection of the appropriate exponent for the performance index. The potential of the proposed distribution factor-model in contingency selection has been tested uut on the IEEE-30 bus and the IEEE-14 bus system

For more details click here

back

Title : VLSI Implementation Of CMOS Neuron And Associate Memory
Author(s) : Dhillon S S
Roll No : 9210455
Supervisor(s) : Hasan Mohammad Mozaffarul

Abstract

Recently interest in Neural Networks has been revived due to progress in Analog VLSI technology, increase in computing power and introduction of concept of energy. A biological neuron consists of four main components: synapses, dendrite, cell body and axon . Analog, optoelectronic and digital are three main approaches used, to implement neuron. Analog approach was selected for simulations in this work due to various advantages it offers. Artificial neuron is required to perform multiplication, summation and thresholding. After presenting the mathematical and functional models the electronic circuits which can perform these function has been presented. Artificial neuron was designed implementing variable synapses by wide - range version of Gilbert's multiplier as the circuit can accept input down to few milli volts and can work in subthreshold. Weight storage in an analog manner on MOS capacitor has been used as this gives adequate precision and allows both negative and positive weight storage on the same node. It can also support refreshing techniques, and learning without any changes. Spatial summation has been done using wired OR and temporal summation using a capacitor. Further wide range version of transconductance amplifier has been used as comparator for thresholding and implementing tanh output function. The neuron was designed using CMOS technology, and has been simulated extensively using level 2 of SPICE, for inhibitory and excitatory synapses and it functions as desired. There are wide range of applications for which neural network can be used. Neural computation has been introduced and concept that highly interconnected network of analog neuron can be effectively used for computing has been reviewed. Feed forward and feedback network has been presented and applications of both discussed. After introducing concept of template matching and associate memory, the neuron designed in this work has been used to implements template matching and associate memory applications.

For more details click here

back

Title : *Dc-Ac Power Converter With High-Frequency Link*
Author(s) : *Nagarajan R*
Roll No : *9210425*
Supervisor(s) : *Dubey G K*

Abstract

The present work involves the development of a high power density dc - ac power conversion system. An analysis of the converter is presented and the averaged equivalent circuit for the low frequency is derived. Method for reducing the switching surges during the commutation of the devices is presented. The operation at high frequency and use of a transformer with ferrite core permits the replacement of the low frequency iron core transformer which is used in conventional dc - ac power conversion systems. This helps in increasing the power - per - unit - mass/ volume of the converter system. This dc - ac converter is especially suitable for small uninterruptible power supply (UPS) systems. A 100 VA prototype converter is developed and experimentally tested to support the analytical performance

For more details click here

back

Title : *Design Of A High Speed CMOS VLSI Floating Point Arithmetic Processor*
Author(s) : *Sitharam A*
Roll No : *9210413*
Supervisor(s) : *Hasan Mohammad Mozaffarul*

Abstract

A high speed VLST floating point arithmetic processor has been designed and implemented using CMOS technology. The processor performs the four basic arithmetic operations viz. Addition, subtraction. Multiplication and division. The processor achieves its high execution through data parallelism, pipelining, and vector chaining. A 16 - bit ring's adder/subtract has been designed and implemented in CMOS, for the mantissa addition/subtraction. The operation is achieved by supplying the complemented form of the subtrahend bits to the adder. An 8×8 bit array multiplier using five - counter cells, has been implemented for the mantissa multiplication. The five - counter multiplier is twice as fast as the full adder multiplier, but has only a marginal increase in hardware. An 8×8 restoring cellular array divider, using carry look - ahead technique, has been implemented to achieve the division operation. The mantissa shifting operation is done by an 8×8 linear, right -shift, left -shift barrel shifter. A 4 - bit adder/subtractor is used for the exponent addition/subtraction

For more details click here

back

Title : ***An Investigation On Effect Of Pre-Ionization On The Lightning Air Terminal***
Author(s) : ***Davar Vivek***
Roll No : ***9210456***
Supervisor(s) : ***Arora Ravindra***

Abstract

This report presented the laboratory investigation carried out to study the effects of pre-ionization on the lightning conductors provided for the protection of buildings and structures from lightning discharge. Before describing the experimental set up the test procedures, some important topics such as the lightning phenomenon in nature and the breakdown in different field configurations have been discussed. Most of the work from literature in this field has been found to be the shape and size of the lightning conductor air terminal. Preliminary laboratory investigations revealed that there is a considerable effect of pre-ionization on the breakdown strength of air measured for gap lengths of 6 and 10 cm. Hence an Active Air Terminal was created which could be energized to study the attraction for lightning. It was necessary to isolate the emerging circuit from getting demand from lightning discharges and still provide a path to the lightning discharge towards the ground. A substantial amount of experimental work was performed to study the 'surface area,' and the 'pre-ionization' effects. Passive air terminal electrodes Air Terminals to be able to make a comparison of the performance of the two. The effect of pre-ionization on the zone of protection derived from the rolling sphere was also investigated. Scaled models of the protection zone with Active Air Terminal was fabricated. Investigation on this model confirmed the effect of pre-ionization on the zone of protection derived from the rolling Sphere Method. During the course of these experimental investigations account measurements of lightning impulse magnitude were possible by using an oscilloscope with high digitizing rate.

For more details click here

back

Title : *An Investigation Of The Schwaiger Factor Limit In Air*
Author(s) : *PremSunil*
Roll No : *9210454*
Supervisor(s) : *Arora Ravindra*

Abstract

Electric fields can be classified as uniform, weakly nonuniform and extremely nonuniform fields depending upon the potential gradient the electrode gap. A factor known as the Schwaiger Factor (n), which has a value greater than 1 or less than or equal to 1 gives the degree of nonuniformity of the field for the given electrode configuration. Coronas or stable partial discharges in dielectrics take place only under extremely nonuniform field conditions. Three types of corona namely glow/avalanche streamer and leader corona have been identified according to their occurrence under different electrode configurations. In enclosed gaseous dielectrics for example in Gas Insulated Systems (GIS), extremely nonuniform fields are unacceptable as the result of corona activity may cause deterioration of the enclosed gaseous dielectric. It is therefore desired to determine the lowest value of n described as the Schwaiger Factor Limit (n_{lim}) for which the field remains to be weakly nonuniform. In this work the value of the Schwaiger Factor Limit (n_{lim}) for air has been experimentally determined under laboratory conditions using ac power frequency voltage. The investigations were carried out with the help of a Partial Discharge Measuring Unit MUT 8 and a high sampling rate digital oscilloscope. Set of spherical electrodes of different sizes were used to be able to produce different values of n between the two electrodes beside investigating the effect of electrode size on the value of the Schwaiger Factor Limit. The effect of pressure variation on this factor was also investigated. The value of the Schwaiger factor Limit (n_{lim}) for air at atmospheric pressure was found to be in the range 25. Variation in electrode size produced no noticeable change in this limit. The variation in air pressure was also not found to affect this limit. The average breakdown strength of air at n_{lim} and at atmospheric pressure is estimated to vary from 16 to 13 kV (peak)/cm as the electrode size is increased from 9.92 mm to 31.7 mm (diameters of the spheres). For spherical electrodes, a transition from weakly to extremely nonuniform field is accompanied with streamer corona. By making the field configuration extremely nonuniform, the average potential gradient across a streamer corona for ac power frequency voltage was also determined. It was found to be about 4 to 4.8 kV (peak)/cm for values of n_{lim} just below 1, i.e., for field configurations which are just in the extremely nonuniform range. As the field became more extremely nonuniform this potential gradient increased to about 7 kV (peak)/cm. The effect of pressure variation on the breakdown strength of air was also investigated.

For more details click here

back

Title : *Analysis Simulation Design And Imlementation Of LCC Resonant Dc To Dc Converter*
Author(s) : *Rao M Ramachandra*
Roll No : *9210422*
Supervisor(s) : *Doradla S R*

Abstract

A detailed study of LCC Resonant DC to DC Converter is presented. Pulse width modulation is employed to control and regulate the output load voltage. Five different modes of operation of the converter in each cycle are identified under steady state conditions. Using constant current model and state - space approach, general solutions are obtained. An approximate model is used to derive the steady - state expressions. Design curves are obtained from the analysis. The proposed converter is simulated using SPICE3 software package to predict the different waveforms. A simple design procedure is presented for selecting the various parameters and components. Resonant link component stresses are calculated. A 100 w prototype converter is developed and experimentally tested

For more details click here

back

Title : *Digital Computation Of Continuous Current Carrying Capacity Of Cables*
Author(s) : *Kishor Anand*
Roll No : *9210405*
Supervisor(s) : *Arora Ravindra*

Abstract

To achieve maximum economy in cost and subsequently in operation of cables, an important aspect is the selection of the optimum size of conductor. Several factors are involved in this consideration. While the continuous current carrying capacity is paramount, other factors such as voltage drop, cost of losses and ability to carry shortcircuit currents must not be neglected. The current rating is dependent on the way the heat is transmitted to the cable surface and then dissipated to the surroundings. A maximum conductor temperature is fixed which is commonly the limiting temperature for the insulation material. This ensures a reasonable life for the cable. Then by choosing a base ambient temperature for the surroundings, a permissible temperature rise is obtained from which the maximum cable rating can be computed for the particular environment. Various factors and aspects dealing with different possible combinations of circumstances need to be considered. For example losses in metal sheaths and armour, eddy current losses (for a.c. cables), thermal resistance of different parts of cables, different conditions of installations, heat dissipating properties of the cable etc. Taking all these factors into consideration, the calculation really turns out to be enormous, using more than a hundred different formulae and more than a hundred and fifty different variables! An algorithm for the computation of continuous current rating has, therefore, been developed and the same has been implemented as computer program. Care should be taken in applying the appropriate rating factors to cater for the actual installation conditions and mode of operation

For more details click here

back

Title : ***Design And Study Of Model Reference Adaptive PSS And Svc Stabilizers For Dynamic Stability***
Author(s) : ***Singh Raj Kumar***
Roll No : ***9110433***
Supervisor(s) : ***Prabhu S S& Sachchidanand***

Abstract

This thesis is concerned with design of Model Reference Adaptive PSS and SVC Stabilizers and study of their operation in both singular and simultaneous operations. Lyapunov's criterion has been used to ensure overall System Stability. Since all the states are not available for measurement, observers are designed to estimate the unknown states. With the help of speed input MRAPSS it has been shown that the controllers work for large changes around the operating point too, provided these changes take place very slowly

For more details click here

back

Title : *A Software Package For SCB With Applications To LTR*
Author(s) : *Vydyanathan V K*
Roll No : *9210447*
Supervisor(s) : *Hole K E*

Abstract

The Loop Transfer Recovery design methodology for the design of robust controllers for a Linear Time Invariant, Multi-Input Multi-Output system is studied in detail. A software package for handling LTR design by Asymptotic Time-scale and Eigenstructure Assignment algorithm is developed in this thesis. The algorithm is critically dependent on the representation of the plant in a Special coordinate Basis. So the model of the plant needs to be first converted into its SCB representation before the proceeding with the design. This gap is taken care of by this implementation. The implementation is tested using a few numerical examples taken from the literature, which clearly demonstrates the power of this method.

For more details click here

back