Proceedings of

ESDA 2021

4th International Conference on

Energy Systems, Drives and Automations

30th and 31st of December, 2021

Organizer:

Applied Computer Technology
Kolkata, West Bengal, India.
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In Association with:
International Association of Science, Technology and Management

ESDA 2021

4th international conference on

Energy Systems, Drives and Automations

December 30th and 31st 2021

Venue: Hotel The Maureen, VIP Road, Kolkata-700059

On 31st December : as Online mode

Proceeding Book with abstract of papers

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Applied Computer Technology,

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Inaugural Song:

Prayer
Translated in English
By
Hillol Ray
http://www.iwvpa.net/rayh
http://www.iwvpa.net/rayh/index-hra.php

Desires are all yours,
You are the universal star-
You do your own works, mom,
People say, I do them from a far!!

You stuck elephant into clay,
And push a handicap to ascend hill-
To some, you offer "Brahmo" feet,
And make others descend downhill!!

I am a machine, you are the machinist,
I am the home, you are the homemaker-

I am the chariot, you are the charioteer,
You drive as you like, and I am a happy taker!!

"Milestone"
June 25, 2019
Garland, Texas, USA

Editorial

On behalf of the Applied Computer Technology Kolkata, and International Association of Science, Technology and Management, the organizing committee of ESDA2021 is delighted to invite you to the 4th international conference on Energy Systems, Drives and Automations. The conference will be held as mixed mode, on 30th at Hotel Maureen, Kolkata and on 31st as Online mode.

In the light of current exceptional Corona and Omicron circumstances, ESDA2021 has been re-envisioned as physical mode with limited gathering on 30th December 2021 for the safety of our participants arranging precautions like wearing Masks, washing hands with sanitizers and to sit with sufficient distances. This conference with physical and virtual formats will provide an opportunity for our community to present their research works and collaborate with their peers across the globe.

About 90 papers are received and 55 are selected for presentation. Most of the papers are in the areas of Energy conversion and Green energy technology, control and automations, Solar Energy, Bio Mass Energy, Electrical Vehicle Systems, Fuel Cells, Smart Grid Technologies, Micro Grid Technologies, Electric Conversion Systems, soft computing and optimization techniques, Hybrid Energy Systems, Energy Conservation and Auditing, Energy Storage and Battery Management, Conventional and Special Electrical Machines, Application of Control Theory, Industrial Drives, High Voltage Engineering, memory and storage circuits and devices etc.

A Special Issue of the Journal of Microsystem Technologies of Springer-Nature, SCI indexed and having impact factor=2.7 will be published with some good quality of papers of ESDA2021. Some other papers will be invited for possible inclusion to the Proceedings of LNEE (Lecture Notes on Electrical Engineering) book series of Springer having SCOPUS index and impact factor=0.4.

With due thanks and best wishes to all our team members including the Chief Guest, Keynote Speakers, invited speakers, Chair persons, Authors, participants etc. for sparing their valuable time in making the event a success in this typical pandemic period.

These proceedings are prepared with the abstracts of all papers for the delegates of the conference and for offline uses only- which will never be available online as because, after the conference, most of the papers will be forwarded for possible publications in different Journals or as Book Chapters.

The Editors
ESDA2021

4th International Conference on
"Energy Systems, Drives and Automations", ESDA2021
Dates: 30th to 31st December, 2021, Hotel The Maureen, VIP Road, Kolkata, India.
…….

Agenda of Inaugural Session

10:00-10:05 Program conductor, Dr. Ankita Pramanik, Asst.Professor, ETE, Indian Institute of Engineering Science and Technology, Shibpur, Howrah,WB, will take mike and give her introduction and say something about ESDA2021.

She will invite guests on the Dais (Online).

……..

1. **Prof. C K Chanda**, General Chair, ESDA2021, and Professor, IIEST, Shibpur, Howrah, West Bengal
2. **Prof. Jerzy Szymanski**, Kazimierz Pulaski University of Technology and Humanities in Radom, Poland.
3. **Dr. Md. Kamrul Alam Khan,** Professor, Department of Physics, & Ex-Dean, Faculty of Science, Jagannath University, Dhaka-1100, Bangladesh.
4. **Prof. Pradip Kumar Sadhu,** Professor, department of Electrical Engineering Department IIT(ISM) Dhanbad, Jharkhand, India.
5. **Dr. Subimal Roy Barman**, Ex. Chief Engineer, WB State Electricity Company Ltd, WBSETCL
6. **Prof. Dulal Acharjee**, Director of Applied Computer Technology, Kolkata and Chairman of ESDA-2021.
7. Prof. Dr.Piotr Bojarczak ,(Keynote Speaker), Electrical Engineering and Computer Science, University of Technology and Humanities in Radom (UTH Radom), Poland.

Anchor will invite all guests for lightning and for offering flowers to the Portrait of Vidyasagar, Lotfi Zadeh and Michel Faraday.
All guests will take their seats on the dais, Volunteers will offer flower banquet to all guests.
Inaugural Song by : Ms.Debjani Bhattacharya and group.
Then Program conductor will invite all guests to deliver their talks one by one:
Welcome address of general Chair: **Prof. Kamrul Alam Khan**, Professor, Jagannath University, Dhaka, Bangladesh
Prof. Pradip Kumar Sadhu, Professor, department of Electrical Engineering , IIT (ISM) Dhanbad, Jharkhand, India.
(Volunteers will bring packed proceeding books on tray which will be opened by the Chief Guest)
Prof. Dulal Acharjee, Chairman, ESDA-2021 and Director, Applied Computer Technology.
Dr. Subimal Roy Barman, Ex. Chief Engineer, WB State Electricity Company Ltd, WBSETCL

Prof. Jerzy Szymanski, Kazimierz Pulaski University of Technology and Humanities in Radom, Poland.
Prof. Dr.Piotr Bojarczak ,(Keynote Speaker), Electrical Engineering and Computer Science, University of Technology and Humanities in Radom (UTH Radom), Poland.
Prof. **C K Chanda**,(Program Chair, ESDA2021), Professor, EE, IIEST, Shibpur, Howrah,WB.

Vote of thanks by: Dr. Alok Srivastava, dept. of EE, Techno India University, Salt Lake, Kolkata.

END OF INAUGURAL SESSION

TEA BREAK

Presentation Schedule: ESDA2021: during 30-31st of December 2021

Index-Abstract Proceeding Book of ESDA2021

Technical Session-1

Technical Session-2

Technical Session-3

Technical Session-4

Technical Session-5

Technical Session-6

Technical Session-7

Special Session-8

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Prof. Dulal Acharjee
Chairman, ESDA2021 and
Director, Applied Computer Technology, Kolkata

Message of the Chairman

Most of the inventions of science and technology need power and to generate power different machines like: generator, motor and control units are required. This conference, 4th version of International conference on 'Energy Systems, Drives and Automations', ESDA2021, will present various recent research works on different themes of the conference.

India is the world's third largest producer and third largest consumer of electricity. Solar energy is the best alternate source than mineral fuels and the World community should develop efficient storage and discharge systems to control this vast source of energy.

New concepts have come to run electric devices by the surrounded natural power sources, as example, developing auto charging mechanism for small hand held devices- solar cells are used, more uses of natural phenomena like vibration, torque, light, weight, heat etc. may be used for generation of runtime power required for these devices. At surrounding of our locations there are many sources of natural energy which may be reengineered for generation of electricity and the concept is that without mineral fuel how to run electric devices. Gradually percentage of uses of alternate energy should be increased.

Good research and publication works are required for rapid growth of this industry. One of the important parameter of research work is the citation of that publication. In electrical engineering, highest citation was on the paper "Fuzzy System" of Prof. Lotfi A Zadeh. After his death in 2017, we have started an Award "Lotfi Zadeh Memorial Award". In India, the Nobel Laureate Prof. Amartya Sen has the highest citation in Economics subject and he has the third citation in the World. Last year, in ESDA2020, the Keynote Speaker, Prof. Pierluigi Siano from Italy, has highest citation since many years. We offer another great thanks to all who have helped the World to grow the concept of Science and civilization.

In this conference, about 50 papers will be presented; there are papers of authors of seven different countries where some papers are very good in their theoretical concepts and some papers are good in development of applications with state of art. This conference will publish a Special Issue of the Journal of Microsystem Technologies of Springer-Nature having impact factor= 2.7 with some good papers of ESDA2021. Some papers will be included in Proceeding Book of LNEE(lecture notes on electrical engineering) of Springer-Nature, SCOPUS indexed.

The organizer of this conference, Applied Computer Technology, provides supports to publish these papers in different Medias with the help of organizing committee of the conferences.

An international conference is the asset of the research community of the World, it has global visions and the outcome of the conference should be accessible to the all interested researchers. Our mission and vision will try to fulfil this aspect with continuous endeavours.

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CHANDAN KUMAR CHANDA, Ph.D PROFESSOR (HAG) SMIEEE(USA), MIET(UK), Fellow of IE(I) LMISTE, Chartered Engineer (IE) Email: ckc_math@yahoo.com Mob: +919433269567

DEPARTMENT OF ELECTRICAL ENGINEERING INDIAN INSTITUTE OF ENGINEERING SCIENCE AND TECHNOLOGY (IIEST), SHIBPUR P.O. BOTANIC GARDEN HOWRAH-711103, INDIA

Date: 27/12/2021

Message

It is indeed my great pleasure to welcome you all and a privilege to send a message of profound support, love and best wishes to the organizers and participants from academics, industry of the ESDA-2021 which will be held on 30th and 31st December 2021, in spite of extraordinary situation of COVID-19 pandemic across the globe. A good conference is always more than just an exchange of ideas and papers. It is the experience of a common belief nicely expressed in a quote "In a gentle way you can shake the world". The quote sounds over optimistic but in fact we also started 1st ESDA conference with the theme "Energy Drives and Automation" in 2018 and got a huge success. Deeper carbonization strategies are required to reach hard to electricity sectors. There is no "one size" fits all solutions. There is no room for prejudice against one source of energy over other. Therefore we have to adopt a healthy mix of technology if we want to mitigate the impact of climate change and secure affordable and deeper carbonization. It is really a change for the better, to give academia, research scholars, students, and this institutional platform to present their research ideas for the promotion of exposure to research environment. I would also like to congratulate the Chairman, ACT Kolkata, General Chair of ESDA-2021 and other team members without whose untiring efforts this conference would not have possible.

Chandan Kumar Chanda
ESDA-2021

Invited Talk:

Hab. Dr Eng. Jerzy Szymański
ORCID: 0000-0002-9493-8424
WoS Researcher ID AAD-7530-2021
Professor in Radom University – Poland - UE

Biography:

Dr. hab. Eng. Jerzy R. Szymanski is working as a scientific worker and academic lecturer at Technology and Humanities University in Radom Poland with Professor position in Transportation, Electrical and Computer Sciences Faculty in Electric Drives and Power Electronics Devices Division. Prof. Jerzy Szymanski has over 30 years of teaching and research experience in the diverse field of Power Electronic Engineering. His areas of interest include: Power Electronics Converters in Drive Applications, Application of High Frequency Converter in PV and EV Systems, Electromagnetic Compatibility in Power Converters Systems, Hybrid power systems, Exploitation Safety of Electrical Equipment.

He is actively involved in various research projects and international activities (Bilateral and Erasmus/CEEPUS exchange). He has published over 100 research articles in reputed National/International journals and conferences including 20 research papers in SCI-indexed journals. He is a member of the Reviewees and Editorial Board of reputed Journals like MDPI group, Springer, Elsevir. He has authored and coauthored books in reputed editors.

He is a Member of Organizing Committees of International Conferences in Poland and India. The scientific interest includes among others electrical drive systems, electromobility, renewable energy, power electronic converters for electromobility and Renewable Energy Sources (RES), minimizing electromagnetic disturbances generated by power electronic converters, artificial intelligence tools in smart power distribution. At present he is working on the innovative solution related to the usage electronic drive converters as battery chargers also. He participates as board staff in many national and international conferences and seminars.

Talk Summary: – prof. Jerzy Szymanski – Poland/EU

Talk Title: Battery energy management in electric machines and autonomous vehicles

The electrification of the transportation sector is moving on at a fast motion. All car manufacturers have strong programs to electrify their car fleet to fulfill the demands of society and customers by offering carbon-neutral technologies to bring goods and persons from one location to another. Power electronics technology is, in this evolution, essential and also in a rapid development technology-wise. Battery energy management is up till now the one of very important task for consideration by scientists and engineers. The problem with energy management in the energy storages - batteries is very complex.

Common for all vehicle electrical solutions is that the power electronics technology is applied for power processing in many aspects - it is used for the motor drive train, the battery management system, charging the battery, and delivering power to all auxiliary units in a vehicle.

Requirements for batteries of cars and self-propelled electric industrial machines:
- battery parameters, topologies and properties of battery charging converters,
- battery charging stations and integration with the power system and RES (V2G, G2V),
- simulation research and design: energy storage and charging stations for electric vehicles,
- energy management system (EMS) and battery management system (BMS) in smart transformer stations
- IT tools and Industry 4.0 for increasing the efficiency and reliability of electric vehicle power systems.

Dr. Md. Kamrul Alam Khan
Professor,
Department of Physics
& Director,
IQAC (Institutional Quality Assurance Cell)
& Ex- Dean (Faculty of Science)
& Ex-Chairman (Department of Physics)
Jagannath University, 9-10 Chittaranjan Avenue,
Dhaka-1100, Bangladesh.

Welcome Speech by Prof. Dr. Md. Kamrul Alam Khan

General Chair, ESDA2021

It is my pleasure to welcome everyone to our beautiful venue today at Kolkata, India on behalf of the organizing committee of ESDA2021. You know, ESDA 2021, 4th international conference on Energy Systems, Drives and Automations, is for two days conference. I welcome all the eminent speakers and guests from home and abroad to share their knowledge and vast experience with the research community. It is the 4th iinternational conference of ESDA2021 in the history of our research community which will be conducted on both offline and online platform. The offline platform will be in social distancing norms due to COVID-19 pandemic. The theme of this two-day international conference is the using of both non-renewable and renewable energy. I am proud to announce that this international conference is being conducted along with the cooperation of different research organization and universities from home and abroad. The interest to participate in this 4th international conference of ESDA2021 was overwhelming. I am very grateful to them for their support during the 4th international conference of ESDA2021 and thank you very much for the all the participants to contribute their new and innovative outstanding research papers in the conference. Finally, I would like to thank to Prof. Dulal Acharjee and other organizers for making the conference successful. Thanks once again to all.

Prof. dr Piotr Bojarczak

Short Bionote:

Hab. Dr Eng. Piotr Bojarczak is working as professor in the Faculty of Transport, Electrical Engineering and Computer Science at University of Technology and Humanities in Radom (UTH Radom), Poland. He has graduated Doctor of Philosophy (Ph.D) in Electrical Engineering from Warsaw University of Technology. His research areas include image processing, neural networks, deep learning and application of AI in diagnostics of railway infrastructure. He has about 50 scientific publications, 1 patent. He has experiences of working in industry like Graw, Infracert, Telesto, Signalling and Telecommunications Department of Polish Railway Lines.

Title of speech: **Image processing based on deep learning in rail transport.**

Summarize:

The presentation will cover selected deep learning topics in relation to image segmentation and object detection in images and their application in rail transport. It will be shown that image segmentation and object detection in images can be boiled down to a classification process. The structure of a typical classifier consisting of a feature extraction block and a block of the classifier itself will be presented. On this basis, two types of neural networks that perform the classification process will be presented: shallow neural networks and deep neural networks. The main differences between the above-mentioned types of networks with emphasis on deep networks will be presented. Two typical structures of deep networks used for segmentation (Fully Convolutional Neural Network and Deeplabv3) will be presented. Two typical deep network architectures used for object detection in images (YOLO and Faster R-CNN) will also be presented. Their advantages and disadvantages will be given. Next, the principal areas of application of the above-mentioned networks in rail transportation will be presented. These will include visual diagnostics of railroad track conditions (state of sleepers, rail fastenings to sleepers, turnouts) and the types of rails defects. The second area of application is the detection of dangerous events involving humans or animals that occur along the railroad track or at level crossings. The third area of application is the use of networks for detection of fixed railroad infrastructure elements such as semaphores, turnouts, hectometric markers. They allow increasing the accuracy and reliability of systems to determine the position of the train on the route, which in the absence of Bailes use the fusion of data from GPS, Inertial Measuring Unit, and odometer. Finally, the issue related to the problem of limited learning data occurring in deep learning networks and ways to reduce its number by using data augmentation and transfer learning will be presented.

Talk by Guest of Honour:

Talk Title: Present Indian Energy Scenario

Dr. Subimal Roy Barman

Ex. Chief Engineer, WB State Electricity Company Ltd, WBSETCL.

Progress of development as well as economic growth of any country can be measured how much energy it consumes. The cost of energy is a significant factor in the economic activities of a nation. Energy today has become a key factor in deciding the product cost at micro level as well as in dictating the inflation and the debt burden at the macro level. The present day scenario of energy crisis calls for an efficient management of the available energy and energy conservation measures which ultimately stress upon less usage of energy for the same level of activity. Energy audit can play a major role in energy conservation. An energy audit is an inspection, survey and analysis of energy flows, for energy conservation in a building, process or system to reduce the amount of energy input into the system without affecting the output. In commercial and industrial real estate, an energy audit is the first step in identifying opportunities to reduce energy expense and carbon footprints. It attempts to balance the total energy inputs with their use and serves to identify all the energy streams in the systems. It helps in cost optimization, pollution control, safety aspects and suggests methods to improve the operating and maintenance practices of the systems and plugs various loopholes of energy wastage. Time has come for use energy sources that result in low measure of carbon footprint. These 'green choice' programs can provide a strong motivation for growth of renewable energy supply. It has been observed that use of high efficiency equipment can save about 10% to 15% of energy. Proper operational practices alone can also reduce energy consumption by 5% to 10%. Application of alternative processes and modernization in many industries can reduce energy consumption by 30% to 50%. Engineers need to focus on the techniques for optimum usage of energy while planning and designing any building, equipment or process plant, maintaining human comfort, health and safety at the same time.

If we go through the chronological developments of Indian Power Sector, then it can be seen that before independence power was served by the independent power producers, at that period generation capacity was only 1360 MW. For this Electricity Act,1910 was enacted. After independence for rapid development of the country, Electricity Supply Act,1948 was enacted. Through Neheruvian Economic Model, Central Electricity Authority (CEA) & State Electricity Boards are formed. Then power was considered as a social commodity to alleviate poverty also to spread power every corner of the country. Due to this, Green Revolution Program was successfully implemented. But in the year 1991 due to acute financial crisis private sector participation was encouraged by Government of India. In consequence, in the year 2003 after thread bare discussion Electricity Act,2003 was promulgated. Now, Electricity is considered as commodity. After the enactment of the Act huge private sector participation is observed specially in the Generation and Transmission Sectors. A lot of changes will also be made in the Act in near future to bring investment in the Distribution Sector through content & carriage system like Telecom Sector. Assets are being awarded through tariff based competitive bidding instead of cost plus basis earlier. Transmission sector is catering power whole India based on 765 KV Hub and 400 KV Spokes system. At present, total installed capacity is around 388 GW.So huge development is observed in the power sector. A lot of challenging concepts like TTC, ATC, RM, Smart Grid, REC, Power Exchange, Battery/Pump Storage Technology etc are also developed. But delivering quality & quantity marginal priced power to end consumers from Generation Hub is really

a big challenge till to date. At the end, I hope a grand success of the 4th International Conference on Energy Systems, Drives and Automations at Kolkata and a few burning issues like energy crisis, Energy Management, Power System Automation etc will be discussed in the various session by the Researchers, Experts & Participants of the Conference for fruitful solutions of the problem.

Invited Talk:

Art of Fluid Mechanics at Microfluidic Scale: The Role of Internal Energy

Dr. Pranab K. Mondal

Associate Professor
Department of Mechanical Engineering
Indian Institute of Technology Guwahati, Guwahati – 781039, India
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https://sites.google.com/view/microfluidiclabiitg/home

Abstract:

We encounter plenty of natural phenomena such as movement of water droplet over lotus leaf, rainfall over glass window, where one fluid displacing the other. We show that the surface characteristics patterned by the wettability gradients along with the flow pulsation is of essential importance that the interfacial dynamics of two immiscible fluids in the small scales may corroborate many of the natural phenomena. Presenting a few results of frequency assisted contact line motion of two immiscible fluids over the surfaces with patterned wettability gradient, we show how the interfacial dynamics, which is of fundamental importance at micro/nano scales fluid dynamics, is affected by both the surface characteristics and flow pulsation. With the advent of microfluidic devices, droplets are widely used in several biomedical and biotechnological applications. There are several droplet-based microfluidic devices in which external fields (e.g., magnetic field) are applied to achieve augmented fluidic functionalities by the precise manipulation of the internal flow dynamics. Thus, understanding of the fundamental principles governing the underlying transport processes inside the droplet field is the key towards the design and development of such devices. We address a few questions related to transport characteristics of a magnetic-fluid droplet subjected to external magnetic field. The primary focus of the research topics, addressed in this work, is to understand the intricate hydrodynamics of magnetic-fluid flow under the influence of an external magnetic field, primarily attributed to the tremendous potential of magnetic-fluid for non-invasive flow manipulation. A few cases pertaining to this research work are discussed systematically. Towards this, we first discuss the effect of the internal hydrodynamics of a sessile magnetic-fluid droplet in the presence of a time-dependent magnetic field and its implication on the mixing characteristics with a non-magnetic droplet. We show that there exists a threshold frequency of the applied magnetic field at which the mixing time between two droplets becomes a minimum. Also, we establish that by judicious application of magnetic field, the overall mixing time between droplets can be reduced by almost 80% in comparison to that of no applied field case. In another case study, we experimentally explore the evaporation kinetics of a sessile magnetic-fluid droplet under the modulation of a time-dependent magnetic field. The investigation reveals that the droplet evaporation rate is augmented substantially in the presence of the applied field, attributed to the non-trivial dynamics played by the magnetic nanoparticles on maneuvering the pinning/de-pinning behavior of the contact line. Pertaining to this analysis, we also find a critical frequency at which the magnetic-fluid droplet exhibits a minimum life-time. We believe that the outcomes of the above-stated investigations will facilitate the research community to acquire an idea about the various hydrodynamic controlling parameters to achieve fine-tuned dynamics of magnetic-fluid droplet in the presence of a magnetic field towards the desired fluidic functionalities.

Paper ID: 14

Radiation Tolerant by Design 12-Transistor Static Random Access Memory

Monalisa Pandey, Aminul Islam
Dept. of ECE, BIT, Mesra, Ranchi, Jharkhand, India

Abstract:

In this paper, we propose a radiation-tolerant by design 12 transistor (RTBD 12T) based Static Random Access Memory (SRAM) cell for deep space application. The designed SRAM cell can effectively tolerate radiation events. It exhibits high resilience towards radiation upsets and accordingly three out of four nodes of the cell are fully immune to radiation upsets and it has a critical charge (Qc) equal to 1.6 fC making it a more promising choice for deep space application. The design metrics of the proposed SRAM cell are compared with a few conventionally used SRAM cells like 6T, Quad node (QUATRO 10T) SRAM, Quadruple cross coupled storage cells (QUCCE 12T) and Writability Enhanced (WEQUATRO). The proposed SRAM cell exhibits improved results in terms of hold power, which is (0.86×), (0.40×) and (0.74×) compared to that of QUATRO 10T, QUCCE 12T and WEQUATRO, respectively. The proposed SRAM cell exhibits a marginal degradation in the read and write access times. With regards to stability, the proposed SRAM cell exhibits higher Read Static Noise Margin (RSNM) and write margin(WM) implying higher cell stability during the read and write operations compared to other conventionally used SRAM cells. The theoretical design and the above-stated design metrics of the RTBD 12T SRAM cell are validated through extensive simulations on Simulation Program with Integrated Circuit Emphasis (SPICE) using 16-nm high-performance technology.

Keywords: RSNM, SET, SEU, Critical charge, SEMNU

Paper ID: 54

Co-optimization of Energy and Reserve Capacities through Expected Load Not Served

Priyanjali Mukherjee[1] , Sudhangshu Sarkar[2] , Bishaljit Paul[3]

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Narula Institute of Technology
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Chandan Kumar Chanda[4]
[4]*Department of Electrical Engineering*
IIEST Shibpur
Howrah, India

Abstract:

Electricity is difficult to store like other commodities and is available on demand. Due to the ever-increasing load, generators are equipped with reserves, and optimization is essential to reduce the operational cost. Additionally, demand and supply vary continuously. The system's frequency changes may cause system load fluctuations and sudden power outages for any mismatch between them. The state of the art applied in this paper for minimization of the operational cost for generator production and its reserves are sequential and simultaneous methods. This paper explores and reveals DC load flow optimization in a three-bus system. This method can also be applied in higher bus systems. The energy costs at different nodes are examined by the locational marginal prices (LMPs), and how the dispatch of energy and reserve capacities are available for the market participants at the minimum price has been depicted in the paper. The reserve requirement is also calculated through a probabilistic approach through the expected load not served.

Keywords: reserve capacity, co-optimization, ELNS

Paper ID: 16

An Improved SEC-DED-DAEC Code for SRAMs

Raj Kumar Maity[1], Jagannath Samanta[1], Jaydeb Bhaumik[2]

[1]Department of ECE, Haldia Institute of Technology, West Bengal– 721657, INDIA
[2]Department of ETCE, Jadavpur University, West Bengal, INDIA

Abstract:

Reliability of Static Random Access Memories (SRAMs) is strongly influenced by radiation induced soft errors. Multiple Cell Upsets (MCUs) caused by radiation corrupt data stored in multiple cells of SRAMs. Error Correcting Codes (ECCs) are commonly employed to mitigate the effect of MCUs. Single Error Correction-Double Error Detection (SEC-DED) codes are not the appropriate choice against MCUs rather these codes are suitable for protecting memory against Single Cell Upset (SCU). Single Error Correction-Double Error Detection-Double Adjacent Error Correction (SEC-DED-DAEC) codes are more suitable due to increasing trends of double adjacent errors. In this paper, a new SEC-DED-DAEC code has been proposed. Proposed codecs have been designed using new parity check matrices for different word lengths which are frequently used in memory. The mis-correction probability of proposed SEC-DEDDAEC codes are at most 84.50% and 78.45% lower for 2- random and 3-random errors respectively with respect to related existing designs. Proposed codecs have been simulated and synthesized in ASIC platform. It is observed that area and power consumption of the proposed codecs are reduced up to 8.93% and 21.47% compared to the recently published results respectively.

Keywords: SRAMs, MCUs, Error Correction Codes (ECCs), SEC-DED code, SEC-DED-DAEC code, ASIC.

Paper ID: 32

On smart monitoring system for underground mine

Ankita RayChowdhury1 and Ankita Pramanik2 and Gopal Chandra Roy3

Department of Electronics & Telecommunication Engineering[1,2]
Department of Mining Engineering[3]
Indian Institute of Engineering Science and Technology, Shibpur, Howrah, West Bengal, India

Abstract:

Underground mine air gets contaminated as the mineral extraction process liberates toxic gases, causing detri- mental effects on the health of the miners. To alleviate this unavoidable situation the proposed work incorporates advanced communication technology in mining industry to provide a sustainable framework for miners. The work proposes an algorithm to implement smart mine monitoring system. The algorithm involves monitoring of two most deadly conditions: firedamp and whitedamp in an underground coal mine as well as temperature and humidity. The proposed system architecture involves long range (LoRa) technology for establishing wireless communication channel between underground and above the ground systems. To examine the quality of mine air, the authors have proposed a mine atmospheric hazard index (MAHI). The system is so designed as to send notification to the miners about the environmental condition of the workplace.

Index Terms—underground mine environment, working condition, Miner's health condition, ergonomic, remote monitoring, alert system.

Paper ID: 18

A Novel Fast Charging Method for Lead Acid Batteries of Battery Operated Three Wheeled Vehicle

Bidrohi Bhattacharjee[1], Pradip Kumar Sadhu[1], Ankur Ganguly[2], Ashok Kumar Naskar[3], Arindam Mondal[4]

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2 Department of Electrical Engineering, Meghnad Saha Institute of Technology, Kolkata, West Bengal, India
3Department of Electrical Engineering, Techno International Batanagar, Maheshtala, Kolkata, India.
4Department of Electrical and Electronics Engineering, Swami Vivekananda Institute of Science and Technology, Kolkata, West Bengal, India

Abstract:

The use of Electrical Vehicles is increasing rapidly day by day for the purpose of resolving the energy crisis and to provide eco friendly mode of transport. Battery operated three wheeled vehicles(BoTV) are the most prevalent source of conveyance in rural India, especially in rural Bengal, mainly due to their felicitousness for excursions, low road space occupancy, navigation in narrow roads, road flexibility, door-to-door accommodations as well as income generating source. The battery charging for (BoTV) is an alarming issue nowadays. Battery charging time and battery life depend on the nature and the characteristic of the battery charger. High power density, less weight and low volume along with the low charging cost are the characteristics of battery to be used for its optimum output reliability .Use of renewable energy for the charging of batteries may solve the problem of frequent shutdown of electricity which is the major problem in rural Bengal for battery charging. The objective of this paper is to introduce a photovoltaic (PV) energy based fast charger for BoTV. The implementation of the work includes 48-volts battery charging system for 1000W Brush less DC(BLDC) motor based three wheel vehicle by solar energy.

Keywords: *Asymmetric half bridge converter, battery operated three wheeled vehicle, electric vehicle, fast charging, solar energy, VRLA battery*.

Paper ID: 55

Balancing Power Market in a Congested System through Stochastic Production

Dipu Mistry[1] , Sushovan Goswami[2], Bishaljit Paul[3]

[1]Department of Electrical Engineering
Narula Institute of Technology
Kolkata, India

Chandan Kumar Chanda[4]
[4]Department of Electrical Engineering
IIEST Shibpur
Howrah, India

Abstract:

In developed countries, the electricity market has been initially designed for reserve dispatchable power plants and inflexible demand. Sustainable energy sources are the most reliable energy sources. The stochastic electricity market model is a generalization of the deterministic dynamic model for the high penetration of intermittent sustainable energy and the transformation of the consumers' energy space. To maintain the security and reliability in a deregulated power scenario, spinning reserves which are one of the most important ancillary services are very much related with contingency of the system. The economic performance of the day-ahead energy-reserve dispatch is improved by obliquely accounting for its impact of operating costs by stochastic production. This paper reveals, through a two-bus system which can be applied also in higher bus systems, that under stochastic generation with the penetration of the wind, the total operational cost becomes least when probabilistic scenario of wind generation is taken into account, besides no wind generation and network congestion.

Index Terms- Spinning reserve, Stochastic production, Deregulated power market, Congestion.

Paper ID: 62

Photovoltaic Grid Management Systems with Sliding Mode Control

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Abstract:

Sliding-mode control of photovoltaic energy conversion systems is now possible. P&O MPPT technology, which monitors a solar panel's maximum power point by disturbance and observation, boosts the solar panel's output capacity. It is imperative that we use a nonlinear control method in order to maximize energy conversion efficiency while coping with the inherent nonlinear dynamics of power converters. The goal of this research is to propose innovative first-order sliding mode control algorithms in order to give a reliable and optimal method of regulating solar energy conversion. First-order buck-boost converter chattering and THD issues are being addressed using a sliding mode control for nonlinear loads. In addition, the system's power quality was improved. The output of the DC–DC converter is connected to a voltage-oriented control (VOC)-based space-vector pulse-width-modulated inverter that generates three-phase alternating current (AC). A MATLAB computer simulation was used to test the solar energy conversion system's durability and efficacy.

Keywords: Photovoltaic (PV) systems; Power Quality; Maximum Power Point Tracker (MPPT); Buck-Boost Converter; Sliding Mode Control (SMC).

Paper ID: 19

Electric Vehicles Charging Management Using Machine Learning to Save Grid and Provide Fast Charging

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Abstract

For the past few years, electric vehicles usage has increased on a large scale. Thus, there is a high demand now for the fast charging of them. But many Electric Vehicle Charging Stations (EVCS) in order to provide fast charging are a_ecting the power grid of that particular area and so, in order to save power grid, many methods are being applied like installations of solar panels, etc. But these methods have a high initial cost, are expensive to store the energy, and require a large amount of area also. Thus, to provide a cost-e_cient solution to solve this problem and to avoid uncoordinated charging the Machine Learning techniques (ML) are proposed to avoid voltage fluctuation, load variance and to increase power quality. ML models can be used to predict when to provide fast charging to charge the EV depending on the power. This paper describes using ML algorithms like Kernel-Support Vector Machine (SVM), Random Forest Classifier, K-Nearest Neighbors (K-NN), Decision Tree Classifier, Naive Bayes, Artificial Neural Network (CNN), Long Short-Term Memory (LSTM), XGBoost, and CatBoost. After implementation, the three best models were choosen: Random Forest Classifier, Decision Tree Classifier, and XGBoost. Based on results, the XGBoost is chosen as the best model as it is more optimized performance.

Paper ID: 58

Stabilizing transient and controlling of fault using UPFC In an interconnected power grid

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Abstract:

The performance and transient stabilizing using unified power flow controller (UPFC) anticipated for grid consisting of parallel connected two number of three-phase transmission lines is presented in this paper. The interruption happened in absence of UPFC connected to three phase line increases the impedance of line double and consequently reduces the flow of active power. The volume of active power flowing through the grid can be control by installing UPFC to the grid. The conditions for transient stability are suggested by the transient model and UPFC interconnected power grid. The complete dynamic control is modeled by the active and reactive power wave developed during transient events. A series of simulations presented in this paper to show the effectiveness and correctness of the methodology applied for transient stability.

Keywords: Line fault, transient stability, grid, UPFC.

Paper ID: 23

Gap-opening in Graphene by Substrate-induced Strain-engineering Coupled with Magnetic Spin-engineering

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Abstract:

Currently, Graphene is emerging as the magic material in the electronics industry. Graphene possesses an enigmatic yet excellent range of material properties. That includes superb mobility, electrical conductivity, high thermal conductivity, mechanical strength as well as flexibility. Besides Graphene is a transparent material. Further, Graphene is also remarkably suitable for bio-electronic applications due to its anti-bacterial properties, low Joule heat generation and high density that allow rapid passage for water evaporation. Also, Graphene is promising for low power VLSI design as a result of its low drive power consumption. However, its one drawback that prohibits the large scale, low cost implementation of Graphene-electronics is its non-existent band-gap. Therefore, both research and commercial fraternities are on a quest of suitable method for band-gap opening in Graphene. Several methods including light-incidence, impurity-doping, etc have been investigated. But very little has been availed till date. Moreover, all such methods come with inherent drawbacks that are as severe as decrease in mobility. The current paper proposes a coupled strain-spin engineering technique for inducing band gap in Graphene. Since Graphene is two-dimensional material, therefore, a supporting substrate is a basic necessity in Graphene-electronics. This paper proposes MgO and TiO2 substrates for mounting Graphene conducting layer. This in turn, results in a considerable band gap in Graphene. Subsequently, magnetic spin effect has been used to tailor such band gap, according to the requirement of the implementation. Further, by proper application and withdrawal of applied electric field, such strain-induced band gap has been used for information and memory electronics. ANSYS Multiphysics simulator has been calibrated with experimental observations and has been subsequently used to compare the analytical results. Excellent and promising findings have been reported for the first time.

Keywords: Band-gap, Graphene, mobility, spin, strain-engineering, substrate

Paper ID: 27

Study and Analysis of 6H-SiC-based Al0.30Ga0.70N/GaN HEMT for Microwave Frequency Applications

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Abstract:

This research work is based on the study and analysis of 6H-SiC-based Al0.30Ga0.70N/GaN HEMT with T-shaped gate for Microwave Frequency applications. DC, RF and Noise parameters have been discussed in detail for the proposed device. The proposed HEMT exhibits good DC, RF and Noise parameters. DC parameters including maximum drain current (*I*DMAX), threshold voltage (*V*t) and transconductance (*g*m) have been analysed with good results. The simulated value of *I*DMAX is 808 mA/mm at *V*GS = 0 V, *V*t is -0.957 V and *g*m is 741 mS/mm. RF parameters including cut off frequency (*f*T) and maximum oscillation frequency (*f*MAX) have been simulated and the observed values are suitable for Microwave Frequency applications. The observed value of *f*T is 100 GHz and *f*MAX is 147 GHz. Noise parameters including minimum noise figure (*NF*MIN), noise resistance (*R*n) and optimum reflection coefficient (ΓOPT) have been discussed in detail for low noise applications such as low noise amplifier (LNA). All the observed values of noise parameters are lying in the acceptable range for low noise applications. All the noise parameters simulation has been done in the frequency range from 10 GHz to 100 GHz which covers the Ku, K, Ka, and Millimiter Wave (up to 100 GHz) bands defined in IEEE standard of Microwave Frequency. All the simulated and observed values of DC, RF and Noise parameters are verified using Silvaco TCAD tool.

Keywords— *High electron mobility transistor (HEMT); Transition frequency (fT); Maximum Oscillation frequency (fMAX); Minimum Noise Figure (NFMIN).*

Paper ID: 45

Effect of Leakage Inductance on Solar Panel Based Multiple Output Inverter for Induction Heating System

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Abstract:

This paper focuses on the simulation of solar panel based multiple output inverter including leakage inductance. Solar panel is used as the energy source and it is connected to fly-back converter to boost the voltage. The voltage output of the photovoltaic panel is boosted to 181.6V from 16.5V DC using interleaved fly-back converter. Half bridge multiple output inverter is used to produce alternating current in multiple coils. Using this circuit topology multiple loads can be heated simultaneously. All the three coils are connected in parallel. If one coil is damaged then other coils will be able to provide desired output. Wide range of output is studied in terms of current gain. In this proposed circuit two IGBTs have been used as semiconductor switch. Two freewheeling diodes are connected parallel to the IGBTs to provide the discharging path of the energized coils. Current variation through the coil is possible by varying the duty cycle. Simple asymmetrical duty cycle control strategy is used to vary the duty cycle. Available range of current is 2.18 to 2.43 A.

Keywords: Solar panel, interleaved fly-back converter, multiple output half bridge inverter.

Paper ID: 56

A Review on Power System Optimization Using PSO

Sukanya Dasgupta, Arup Halder, Prakash Chakraborty, Subhayan Saha, Sayan Banik, Sudip Ghosh, Kamalika

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Abstract:

This review paper represents a survey of the research progress in Particle Swarm Optimization (PSO) from 2006 to 2021. Total Sixty papers have been assessed. All the papers have been classified into 24 categories based on numerous features. The simplicity of the PSO method inspires the researchers for its uplift and modifications. In a few cases, different researchers implement hybridization of PSO methods successfully. The development of PSO, its upgrade, modifications, comparisons, and applications are discussed here in this paper. In this paper it is shown that objectives can be different but the path will remain the same. It also helps for futuristic works.

Paper ID: 24

An Accurate Electrostatic Actuation Model with Fringing Effect of MEMS Based Ultrasonic Transducer

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Abstract:

In this paper a developed analytical model of electrostatic force for capacitive micromachined ultrasonic transducer (CMUT) has been carried out. These investigation agreements with the Landau's method for modeling the fringing field capacitance in CMUT. Behavior of electrostatic force for parameters like electrode radius, air gap, actuation layer thickness and bias voltage of CMUT are analyzed. CMUT structure with silicon carbide (SiC) as structural material is capable of generating high power ultrasound waves due to appreciable amount of force generation than a silicon nitride (Si_3N_4) counterpart with 19.68% enhancement. Incorporating an insulation layer in the device structure improves the device sensitivity and creates the CMUT prepared to operate securely in higher voltage as well higher temperature. A comparative study between HfO_2/Si_3N_4 isolation is done thoroughly for different insulation thicknesses. An average force enhancement occurs by 24% due to HfO_2 insulation layer. The proposed analytical model outcomes are good agreement with the finite element method (FEM) analysis results.

Keywords: MEMS, CMUT, Micromachined Sensor, FEM

Paper ID: 31

Image Transmission in UWA Channel using OTFS

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Abstract:

In the internet of underwater things (IoUT) application, transmission and reception of image and video is important for remote real time underwater water monitoring. For underwater application, communication is extremely difficult as it has to depend on the highly lossy underwater acoustics (UWA) channel. Image trans- mission through the traditional orthogonal frequency- division multiplexing (OFDM) system sees huge loss. In this paper the 2D modulation scheme of orthogonal time frequency & space (OTFS) is adopted for image transmission in the IoUT application. OTFS is designed by amalgamation of time division multiplexing (TDM) and frequency division multiplexing (FDM) techniques. This work proves that combining OTFS waves and UWA waves, a high resolution image can be prepared for transmission. The proposed scheme is able to convert time-frequency doubly fading UWA channel to time invariant one. The transmitted high resolution image is separable and orthogonal in nature. Here all the delay- Doppler diversity branches are combined in a coherent manner. The high resolution delay-Doppler separation enables OTFS to attain channel capacity with optimal performance-complexity. Robustness against Doppler and multipath channel conditions is also achieved. This work proves that the challenges in image transmission in the UWA channel due to delay Doppler effect can be minimised in superior manner by OTFS than the commonly used technique of OFDM. The efficacy of the proposed model has been established by intensive simulation.

Index Terms—OTFS, OFDM, UWA Channel, Under- water image transmission.

Paper ID: 61

Analysis of Electric Vehicle-to-Grid (V2G) Simulation and Optimal Peak Shaving in Smart Grids

Souvik Banerjee, Arup Halder, Prakash Chakraborty, Sukanya Dasgupta, Subhayan Saha, Pallav Dutta, Arkendu Mitra, Ambarnath Banerji, Bishaljit Paul, Sumanta Kundu, Sudhangshu Sarkar

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Abstract:

Vehicle-to-Grid (V2G) model is very potent, and it has been developed largely for Hybrid Electric Vehicle (HEV) implementation. A modified V2G control model has been established. Different kinds of renewable energy sources, the Idle time of vehicles' and Generation of power have been taken into consideration simultaneously as per the daily schedule of the vehicle user. Vehicle-to-Grid technology is controlled by keeping the relationship with the desired battery state-of-charge and plug-in material detection. In this paper, the proposed model is implemented and represented by MATLAB. In this paper, we have researched how to shave the house load with the help of Vehicle-to-grid technology.

Keywords— *Vehicle-to-grid, Electrical Vehicle, Smart grids, Peak shaving.*

Paper ID: 42

AWS IoT Core and Amazon DeepAR based Predictive Real-time Monitoring Framework for Industrial Induction Heating Systems

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Abstract:

For embracing Industry 4.0, various industries are implementing process automation and have started leveraging interconnectedness through Industrial Internet of Things. With the help of cloud based solutions, data captured through distributed IoT (Internet of Things) sensors are readily available for system monitoring enabling effective and smart system monitoring with higher predictive results. The industries that leverage induction heating systems are also aiming at accomplishing digital transformation to adopt Industry 4.0 and guidelines in this regard are most sought after at this moment. Establishing a real-time monitoring framework for the induction heating systems is a critical enabler for Industry 4.0 adoption. The authors have presented a case study of the real-time monitoring framework for industrial induction heating systems that will enable digital transformation of such industries. This framework is based on AWS (Amazon Web Services) IoT Core and Amazon DeepAR. It takes the full advantage of Amazon cloud features and functionalities. The case study includes development of a web application using React, Node.js and Express to display various dashboards and predictions as well. It is capable of sending notifications whenever required based on the configurations set. The dashboards generated show the furnace temperature and power levels with an indication whether they are above the desired levels of temperature and power as well as corresponding performance metrics. The framework uses DeepAR algorithm from Amazon SageMaker to generate forecasts so that preventive measures can be initiated in advance. The same framework can be extended to other industrial processes as well.

Keywords: Amazon, AWS, Cloud, DeepAR, IoT, Machine Learning.

Paper ID: 52

A Soft Computing based Technique of Power Net-work Reconfiguration to Reduce Active Power Loss and Improvement of Voltage Profile for Quantifying Power System Resiliency

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Abstract.

In a power network, loadability limit and active power loss are important parameters for the operating personnel. The network reconfiguration technique is more suitable than conventional techniques to curb the active power loss to an optimized level and maintain a good voltage profile as reactive power support is relatively less and gives promising results. Furthermore, high-impact catastrophes such as hurricanes, earthquakes, and fires may make load restoration more difficult due to power network outage from the upstream grid or concurrent component failures. The IEEE-14 bus and IEEE-33 bus distribution systems are implemented using a combination of power network reconfiguration and resiliency network framing. The goal of this research is to offer a soft computing-based effective approach of network reconfiguration in order to reduce active power loss in lines and increase voltage magnitude at buses. The Binary Particle Swarm Optimization (BPSO) technique in the simulation models of power networks successfully achieves faster convergence characteristics and provides a fairly accurate solution. Computer simulations have been accomplished using MATLAB software on IEEE 14 – bus and IEEE 33 – bus systems.

Keywords: Network reconfiguration, resiliency, active power loss, voltage profile improvement, Binary Particle Swarm Optimization (BPSO), distributed generation.

Paper ID: 59

Analysis Of a Power System Under Contingency Using Load Flow Studies

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Abstract:

Designing a power system, a per the perceived generation and load requires conducting the load flow studies. Further analysis of the performance of the power system under contingencies and for future expansion is an important matter. This paper analyzes the power system using various standard IEEE buses. The load flow studies are carried on the MATLAB platform using the MATHSWORK library programs. This analysis forecast maximum loading of any line under contingencies and allows for coordination of the various protection relays and modification of the power system to cater for the contingencies.

Key Words: Load Flow Studies, Contingencies, IEEE Buses, Power Flow, line overloading.

Paper ID: 9

Automation of Human Behaviors and its Prediction using Machine Learning

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Abstract:

Understanding expressive human communication involves a simultaneous examination of speech and gestures since human behavior is communicated through a combination of verbal and nonverbal channels. The Interactive Emotional Dyadic Motion Capture database is a newly compiled acted, multimodal, and multi-speaker database from USC's SAIL lab. The audiovisual content consists of around 12 hours of video, voice, facial motions, and text transcriptions. It comprises of dyadic sessions in which actors execute improvisations or planned scenarios designed to elicit emotions. Various classifiers are employed on text transcripts in this work to determine precision, accuracy, recall, and f1-score, which are also represented in terms of confusion matrices. It has been discovered that deep learning employing the lugwig classifier achieves near-perfect accuracy. The outcomes are presented in order to demonstrate the preceding point.

Keywords — automation, *human behavior, machine learning, artificial intelligence*

Paper ID: 21

A Study on Magnesium Cobalt Zinc $Mg_{0.6-x}Co_xZn_{0.4}$ $(Fe_{1.5}Cr_{0.5})O_4$ (x = 0.0, 0.2, 0.4, 0.6) Ferrite Nanoparticles

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Abstract:

Spinel ferrite nanoparticles (NPs) are potential candidates due to their tremendous magnetic and electrical properties. Magnesium-zinc ferrites are being widely used in various applications such as for reducing hysteresis loses, fabricating the high frequency and high density media storage devices, magnetic reading and recording data sensor devices, and bio-medical applications. In this paper, the variation in structural and magnetic properties of stoichiometery $Mg_{0.6-x}Co_xZn_{0.4}(Fe_{1.5}Cr_{0.5})O_4$ (x = 0.0, 0.2, 0.4, 0.6) ferrite nanoparticles have been studied. Ferrite nanoparticles were synthesized by using Sol-Gel method and average particle size was found at 4-6 nm. NPs were probed by X-ray diffraction (XRD), Vibrating sample magnetometer (VSM) and FT-IR spectroscopy. FT-IR spectra of ferrite NPs revealed two bands centered at 560 and 440 cm^{-1} for tetrahedral and octahedral metal oxygen bond stretching and red shift in the frequency band of tetrahedral M-O stretching was occurred due to the doping with cobalt (Co). The formation of spinel ferrite nanoparticles, expansion of the lattice on Co doping, and enhancement of spinel phase purity in the doped ferrites were confirmed by the XRD analysis. Lattice parameter, crystalline size, X-ray density, bulk density and porosity were also determined from XRD analysis. Magnesium ferrite showed lowering of the magnetic parameters on cobalt doping for x=0.2 which further increased on replacing magnesium ions with nonmagnetic cobalt ions for x = 0.4 and for x = 0.6. Maximum value of saturation magnetization was obtained for x=0.0 and coercivity for x=0.6. In this study, the using of Sol-Gel method serves as a low temperature facile route to synthesize the Co doped ferrite nanoparticles.

Key words: Sol-Gel method; X-ray diffraction (XRD); Vibrating sample magnetometer (VSM); FT-IR spectroscopy; FT-IR spectra of ferrite NPs

Paper ID: 30

A Novel Architecture of Integrator and Differentiator circuits using VDTA

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Abstract:

In this paper, design of a novel integrator and differentiator circuit built using an active device like voltage difference transconductance amplifier (VDTA) has been discussed. The circuits presented in this paper illustrate the design of a differentiator using two VDTAs and a capacitor, and a design of integrator using a VDTA and a capacitor. The circuits presented here work with a power supply of ± 1 V and use current sources with a bias current of 100 µA. The circuits are designed with 180nm CMOS technology using the Virtuoso tool provided by Cadence. The integrator and differentiator have a power consumption of 400µW and 800µW respectively. The voltage gain of the integrator and differentiator is 4.863 and 5.439 respectively at 27 ºC**.** The circuit design has been simulated. PVT analysis of the circuits have been performed, the results are provided.

Keywords: Voltage Difference Transconductance amplifier, Differentiator, Integrator, Active circuit.

Paper ID: 51

Evaluation of Scattering parameters and Unilateral Power Gain for AlGaN/GaN/AlGaN DH-HEMT for Microwave Frequency Applications

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(3) Department of Electronics and Communication Engineering, Maharaja Agrasen Institute of Technology, New Delhi-110086, India.

Abstract

Intrinsic scattering (S) parameters have been evaluated for symmetrically doped AlGaN/GaN/AlGaN DH-HEMT. S-parameters are then further used to evaluate unilateral power Gain (G_U) and maximum frequency of oscillation (f_{max}) which are the major figures of merit in order to judge the potential of the device for future millimeter wave frequency applications. The results have been obtained using the charge control based analytical model and are compared and found to agree well with the ATLAS-2D device simulation results. Results exhibit improved f_{max} and G_U for DH-HEMT as compared to SH-HEMT.

Paper ID: 29

High Performance Code Compression Using Adaptive Encoding For RISC Processor

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Assistant Professor, Department of ECE
Bharath Institute of Higher Education and research, Chennai

Abstract:

In this paper, high performance code compression using adaptive encoding for RISC processor is implemented. The main intent of RISC (Reduced Instruction set Computer) processor is to utilize the small and optimized instructions. Code compression in RISC processor will encode the optimized data to a certain extent. Initially the data is moved from one place to another using data bus buffer. Adaptive encoding will compress the lossless data and characterize the lossless data. Basically, encoding in RISC processor will improve the usage of Look up table's and slices. It causes the more utilization of area, so to overcome this problem adaptive encoding in RISC processor is implemented. From results it is observe that the total delay of conventional encoding in RISC processor is 21.015ns and adaptive encoding in RISC processor is 4.128 ns. Logic delay of conventional encoding in RISC processor is 12.843 ns and adaptive encoding in RISC processor is 3.493 ns. Route delay of conventional encoding in RISC processor is 8.172 ns and adaptive encoding in RISC processor is 0.725 ns. From the simulation results it is observed that the total delay, logic delay, route delay, memory usage, number of slices and number of LUT's are reduced effectively compared with the conventional encoding in RISC processor.

Keywords: RISC, Code compression, ALU, Instruction adaptive decoder and machine cycle adaptive encoder

Paper ID: 34

Characterization of Dynamic C-Gate using GNRFET @ 16-nm Technology Generation

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Abstract:

This paper proposes a low-power variation – immune GNRFET-based dynamic C-gate. The proposed GNRFET-based dynamic C-gate offers ~1.35 × improvement in propagation delay, 2.42 × improvement in average power, ~2.37 × improvement in PDP and ~4.3 × improvement in EDP. All the simulation measurements are taken at proposed OEP decided by the optimum results obtained after extensive simulation on SPICE environment.

Keywords: GNRFET (Graphene Nano Ribbon Field Effect Transistor), PDP (Power-Delay Product), EDP (Energy-Delay Product), t_P (Propagation Delay), C-gate.

Paper ID: 47

Paramount Importance of Boarder Security Smart Robot Using IoT and MATLAB

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Abstract:

In the security border line of control (LoC) are in most cases having been thought about carefully as places where great deal of solidarity between several groups happens, intrusion and violence. This may often lead to perils for the life of soldiers, employees and living in border areas or common man working. Over a greater expanse of space geographical conditions in the same way that deserts, harsh weather forest, water bodies, snow and mountains often lead to difficult to monitoring and access the region of fringing line of control (LoC) areas. Border security patrol systems have recently become interested in make determined efforts to deal with concerns regarding national security system in line of control. One of the most important provocations concerning the protection of long stretches of borders security network is the need for intensive human involvement in patrolling places. With respect to the invention of different electronic patrol techniques, this involvement helps to reduce the need for such measures. Proposed system uses an Ultrasonic Sensor coupled with a MATLAB processing code for detection of infiltrators and various objects. Modules are connected with a Blynk app with sends information to the connected device for intimation of the control system. Software program captures intrusion, displays it in the MATLAB visual processor. The –controlled-motor laser guns are being considered to eliminate under different circumstance conditions at the locations. The network integrates the PIR sensor to identify the specific motion and IR sensors to sense doubtful movements. Based on the command decision, a buzzer sensor goes off [8]. The sensors have been integrated through IoT for an efficient control of connectivity between sites and large border area

Keywords: *LoC, MATLAB, BLYNK APP, IoT, MATLAB Visual Processor.*

Paper ID: 8

A comparative performance evaluation of different optimization approaches for mobile robot path planning in a complex environment

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Abstract:

Path planning is the most important step in robotics that ensure the effective operation of mobile robot in a partially known or unknown complicated environment without colliding with obstacles regions. This research study investigates the implementation of several optimization approaches for path planning such as dynamic programming (DP), A^* approach, dijkstra approach (DA), probabilistic roadmap (PRM) approach, particle swarm optimization (PSO), artificial bee colony (ABC) and hybridization of artificial bee colony with evolutionary programming (ABC-EP) under the different number of samples N. Several performance metrics such as path length (m), processing time (s) and smoothness (rad) are considered for analyzing feasibility of the optimization approaches. The simulation outcomes demonstrate the competitiveness of all the approaches with respect to others and conclude that hybridized ABC-EP is found performing better than other approaches.

Keywords: **-** Path planning, Mobile robot, particle swarm optimization, Smoothness, Optimization

Paper ID: 49

Order reduction of Large Scale LTI Systems using Bonobo Optimizer Algorithm

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3Assistant Professor, Department of Instrumentation & Control Engg., Dr B R Ambedkar National Institute of Technology, Jalandhar, India.

Abstract:

A recent Bonobo Optimizer (BO) technique has been used for reducing the order of large scale Linear Time-Invariant (LTI) systems has been presented. The proposed BO technique is motivated by both the social behaviour as well as reproductive strategies of Bonobos. The natural behaviours of bonobos have been artificially modelled by the proposed algorithm for solving the optimization problem. BO algorithm has been used for minimizing the integral square error (ISE) between the original and proposed Reduced Order Model (ROM) to find its unknown coefficients. Both High Order Systems (HOS) and Low Order Systems (LOS) Step Response have been compared with the help of five different systems in the numerical examples. Different performance indicators have been calculated to exhibit the supremacy of the proposed algorithm. Peak overshoot settling time, different performance indicators have been compared with the proposed technique and recent well known existing techniques for order reduction. Finally, the result shows the superiority of the BO algorithm over other techniques.

Keywords:- Bonobo Optimizer, Order reduction, Meta-heuristic, Integral square Error

Paper ID: 38

Optimization of Inter-Gate Spacing and Recessing of HEMT for RF Applications

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Abstract:

This paper presents a modified HEMT structure that has arrow-headed double gates. The paper gives a good insight into the study and analysis of gate recess and noise analysis of the proposed structure. The proposed design with arrow-headed double gates shows improved RF and DC characteristics and offers an acceptable value of cutoff frequency (f_T = 77 GHz) and maximum oscillation frequency (f_{MAX} = 256 GHz). The fabrication stapes of the proposed structure are presented with a suitable representation. The optimization of the gate which includes positioning of the gates. The values of DC parameters such as V_T, g_m and I_{DS} for the proposed double-gate structure are obtained. Complete simulation results such as I_{DS}-V_{DS}, I_{DS}-V_{GS} characteristics, for the proposed structure have been plotted. The device noise parameters like minimum noise figure (NF_{MIN} = 4.1 dB at f_T=77GHz), Optical Reflection Coefficient (Γ_{ORC} = 0.69 at f_T =77 GHz), and noise transconductance (g_n =0.46 mS/mm at f_T = 77 GHz) are obtained and found to be in the acceptable range. The proposed device operates in the millimetre wave frequency range, and this band of the frequency is used in the latest 5G network and newer generation cell phones.

Keywords— Arrow-headed gate, gate recess, fabrication, RF and DC characteristics, mobility, cutoff frequencies (f_T), maximum oscillation frequency (f_{MAX}), minimum noise figure (NF_{MIN}), Optical Reflection Coefficient(Γ_{ORC}), noise transconductance(g_n).

Paper ID: 20

Measurement of Beam Profile of a Linear Accelerator (LINAC) for 6MV and 10 MV Photon Energies

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Abstract:

Beam Profile is one of the essential parameters which must be obtained before clinical use. This essential parameter is obtained during the commissioning of a Linear Accelerator (LINAC) machine. To measure beam Profile curves for 6 and 10 MV Photon beams VARIAN Linac with different field sizes were used. The measured Profile curves compared with TPS calculated Profile using Beam Analysis Tool of TPS (Varian Eclipse). The measurements were performed for 12 Field Sizes (e.g., 3 × 3 (smallest Field Size), 4 × 4, 6 × 6, 8 × 8, 10 × 10, 12 × 12, 15 × 15, 20 × 20, 25 × 25, 30 × 30, 35 × 35 and 40 × 40 (largest Field Size)) cm^2 for 6 and 10 MV beams of Photon, maintaining the conditions (e.g., voltage and polarity of ion chamber, geometry, incremental direction and step) same. The Mephysto MC^2 software and two Semiflex ionization chambers, electrometer DOSE 1 from PTW for the Varian Linear Accelerator Model D-2300CD were used in this study. The flatness for reference Field Size (FS) 10 × 10 cm^2 at 10 cm depth are 2.28% and 2.38% and the symmetry are 100.75% and 101.00% for 6 and 10 MV energies of Photon respectively. The obtained result for flatness and symmetry are within the limit. The Profile curves which is measured for 6 MV and 10 MV Photon energies show good agreement with the TPS calculated Profile using Beam Analysis Tool of TPS (Varian Eclipse).

Keywords: LINAC, Photon, Energy, Measurement, Profile, TPS, Field Size, Beam Analysis Tool.

Paper ID: 28

A Low-Cost Foot Step Power Generation Using Piezoelectric Sensors

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Abstract:

Electrical energy is important and had been demand improved in the course of the world. conventional approach of producing energy have a direct impact on environment, a lot of electricity is wasted and exhausted with the aid of humans. So, that energy is utilized and converting kinetic Energy to electrical electricity as the stress exerted by way of foot Step and by using the usage of transducers is essentially referred to as foot step power generation system. There exists range of power harvesting strategies through piezo electric powered sensors. This mission would be mounted in crowded locations so when a human walks on a Certain arrangement that unused energy which is in the form of stress or force is transformed to electrical energy. The stress is exerted by using human weighton piezo electric powered sensors device and successfully generates energy to run the ac or dc loads**.**

Keywords: Electricity generation, piezo sensor, Footstep strain

Paper ID: 39

AlGaN/GaN Based HEMT with n-GaN Cap Layer for Satellite Communication System

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Abstract:

The proposed research work investigates the detailed analysis of the $Al_{0.30}Ga_{0.70}N$/GaN based HEMT for satellite communication system. A 3-nm thick n-GaN material is used as a cap layer. Due to the use of the n-GaN cap layer the proposed device exhibits good mobility of 2-DEG, Transconductance (g_m), and drain current. $Al_{0.30}Ga_{0.70}N$/GaN based HEMT having rectangular gate exhibits good DC, RF and Noise parameters. RF parameters cut off frequency (f_T) and maximum oscillation frequency (f_{MAX}) have been analyzed for satellite communication system. The observed value of f_T is 95 GHz and f_{MAX} is 123 GHz. The proposed $Al_{0.30}Ga_{0.70}N$/GaN based HEMT with T-shaped gate further improves the values of f_T and f_{MAX}. The analysis of minimum noise figure (NF_{MIN}), equivalent noise resistance (R_n) and optimum reflection coefficient (Γ_{OPT}) have been done for the low noise applications. All the noise parameters have been obtained by simulating the device in the frequency range from 10 GHz to 90 GHz which covers the Ku, K, Ka, V and W band of microwave frequency defined in IEEE standard. All the simulated and observed values of DC, RF and Noise parameters are verified using Silvaco TCAD tool.

Keywords: High electron mobility transistor (HEMT); **Cut off frequency (f_T)**; Satellite communication system; Maximum Oscillation frequency (f_{MAX}); Minimum Noise Figure (NF_{MIN}).

Paper ID: 46

A study on pulsating nature of Pathor Kuchi Leaf (PKL) electricity

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Abstract:

Direct Current (DC) is divided into two parts. One is pure DC and other is pulsating DC. Direct Current follows ohm's law. To keep it in mind it has been studied the 3 different characteristics of the Pathor Kuchi Leaf (PKL) electricity like ohmic characteristics, pure DC characteristics and Pulsating DC characteristics. Since DC follows the ohm's law so that PKL electricity follows the ohm's law. Nine different parameters like open circuit voltage, short circuit current, maximum power, energy density, specific energy density, power density, specific power density, Energy and capacity of the PKL cell have been studied. Results have been tabulated and graphically discussed. This work will help to generate, storage and utilization of PKL electricity as an alternative source of power generation like solar energy.

Keywords: Open circuit voltage, short circuit current, maximum power, energy density, specific energy density, power density, specific power density, Energy and capacity

Paper ID: 10

Radiation Tolerable 13-Transistor Static Random Access Memory

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Abstract:

This paper proposes a Radiation Tolerable 13T (RT 13T) SRAM cell for deep-space applications. The proposed cell can withstand radiation hazards better than the conventionally used QUCCE 10T SRAM cell. This tolerance against radiation is validated by Critical Charge (*Q*C) analysis in which the proposed SRAM cell exhibits a 17.8% improvement in critical charge compared to QUCCE 10T SRAM cell. Also, the proposed SRAM cell has improved design metrics, i.e., it achieves a 9.4% improvement in hold power (*H*PWR), a 12.7% shorter read delay (TRA) compared to QUCCE 10T SRAM cell. In terms of stability, the proposed cell exhibits excellent read stability, this is validated by the read static noise margin (RSNM) analysis in which the proposed cell achieves a 2.19× higher noise margin compared to QUCCE 10T SRAM cell. Extensive simulations on SPICE using 16-nm CMOS technology are performed to validate the theoretical design of the proposed SRAM cell.

Keywords—SET; SEU; SEMNU; Critical Charge; RSNM.

Paper ID: 15

Compact Circular Ring 2 × 2 MIMO Antenna at 60 GHz for 5G Mobile Communications Applications

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Abstract:

This paper presents a compact size 16 × 16 mm MIMO antenna for 5G wireless mobile applications. The proposed antenna consists of two symmetric circular antenna elements printed on a low-cost Roger 6035 substrate with a partial slotted ground plane. The two sides of the substrate are symmetric and each side is consisting of two radiators with the partial ground planes associated with the two other elements mounted on the other side. The position of the two elements of the front side is called Single Side. If one element is being in the backside and another one on the front side is called dual sides. The purpose of the proposed paper is to decrease the return loss (S-parameters) and the mutual coupling between elements as can as possible. The simulated results are investigated to study the effectiveness of the MIMO-UWB antenna. This work consists of two major parts which are calculation and simulation. High-frequency structure simulator (HFSS) software is used to simulate the designed antenna; it prompts the optimization of the antenna designed to achieve the desired result before proceeding with fabrication. The comparison between theoretical results and the practical result is performed to analyze margin error and trace the probable cause of the error.

Keywords: MIMO antenna, 5G, wireless mobile communication, omni-direction radiation pattern

Paper ID: 33

A VDIBA Based Multifunctional Filter Design

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Abstract:

The design of a multifunctional filter using tunable & balanced voltage differencing inverting buffered amplifier (VDIBA) is presented in this paper. The presented design is resistorless and uses two VDIBA blocks to realize lowpass, highpass and bandpass filter responses. The operation of the presented design is thoroughly examined through detailed analyses. The presented design is simulated using a 45 nanometer CMOS process in Cadence at ±1 V supply voltage.

Keywords: VDIBA, balanced, 45 nm, Cadence virtuoso, Universal filters

Paper ID: 40

An energy-efficient and secure healthcare monitoring framework in IoMT environment

Sanjoy Mondal · Indrakshi Ghosh · Abhishek Das

Abstract :

Internet of Things (IoT) gains abundant popularity in wide applications including medical and healthcare monitoring due to its low cost and its self-operating activities. Recently various wearable devices have become popular in health monitoring systems. In this monitoring system, Biomedical sensor nodes (BSN) are used to sense the various medical parameters of the patients. The sensed data are transmitted to the remote user or Base Station (BS) through the Internet of medical things (IoMT) frameworks for further analysis. Biomedical sensor nodes (BSN) are energy-constrained and the maximum amount of energy is consumed due to its data transmissions. Therefore a crucial research problem is to reduce energy consumptions and communication costs. Moreover, patient data are transmitted over the insecure channel and it leads to security threats. Therefore, ensuring data privacy and integrity is another challenging issue. In this paper, we propose an energy-efficient and secure health monitoring system to reduce the energy consumption and communication cost of the monitoring system. On the other hand, it also provides secured data transmission by incorporating a CBC-based lightweight security mechanism. The extensive simulation results reveal that the proposed framework outperforms the existing work by considerable margins.

Keywords: Health monitoring , IoT, Optimization, Technique, IoMT, Biomedical Sensor Node, CBC.

Paper ID: 35

Detection of Voltage Sags and Compensation in Single Phase Power Systems

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Abstract:

Power quality is the general problem which were occurring regularly in power system network. Voltage drop type of problem which was destroy the quality of power in power system specially in distribution system. The main cause of this voltage drop is control equipment failures and use of non linear loads at distribution system load point. This paper represents the various voltage drop estimations.. with the help these results this paper proposes utilization of single phase potential sag compensators in three phase power system networks which will reduce the overall cost of compensator. This strategy would not eliminate voltage droop completely, but for various loads there is a improvement in reduction of voltage drops.it would reduce voltage list impacts on electrical burdens. With the help of MATLAB/Simulink the proposed method has been simulated.

Key Words: *System reliability, series voltage compensator, voltage drop, Voltage Source Inverter (VSI)*

Paper ID: 36

An Approach for Neuronal Cell Segmentation based on Mask-RCNN

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Dr. B. R. Ambedkar National Institute of Technology
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Abstract:

Neuronal cell segmentation is an essential subject of research for understanding mental illnesses and developing medications to treat them. It is tough and time-consuming to segment each cell from a microscopic images. We introduced an automatic cell segmentation strategy based on the Mask-RCNN model for neural cell segmentation. Mask-RCNN is a state-of-the-art technique for image object detection and instance segmentation. We demonstrate how Mask-RCNN can be used to segment neuronal cell in an effective manner.

Paper ID: 57

Non-Quasi-Static Model Parameter Extraction for Cylindrical Silicon-on-Insulator Schottky Barrier MOSFET

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Abstract:

Cylindrical silicon on insulator (SOI) schottky barrier (SB) MOSFET offers high ION/IOFF ratio with high transconductance. Non-quasi-static (NQS) model is used for analog/RF application with good accuracy. NQS model is developed for cylindrical silicon on insulator (SOI) schottky barrier (SB) MOSFET in this work. The intrinsic and extrinsic parameters of cylindrical SOI SB MOSFET are also compared with cylindrical schottky barrier MOSFET and cylindrical dielectric pocket (DP) schottky barrier MOSFET. The Y_{11}, Y_{12}, Y_{21}, and Y_{22} parameters are extracted for all the MOSFET structures for the development of the NQS model. Further device parasitic capacitances are also extracted and compared for all three MOSFET structures.

Keywords: NQS model, small signal model, SOI SB MOSFET.

Paper ID: 17

Compact Spiral Shaped Slot Loaded Antenna for Multiband Application

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Abstract:

Antenna operates at single frequency can be wielding for any one application. If the antenna has to be wield for multiple operations the number of antennas will increase, which in turn increases system size. The proposed printed antenna with novel spiral shaped slot having circular dumble shaped defective structure results in multiple bands can overcome the stated limitation. Printed patch antenna is designed and simulated using High Frequency Structure Simulator software using Glass epoxy substrate. The proposed antenna has a dimensions of 3.34 X 2.47 X 0.16 cms with low cost substrate shows five different working frequencies with good return loss having impedance bandwidth of 7.93 % with highest gain of 9.92 dB and virtual size reduction of 28.33%. The proposed antenna is resonating between 4.36 GHz to 15.89 GHz which covers L, C, Ku and K band application.

Keywords: Glass epoxy substrate, Spiral shaped slot, Multiband Band;

Paper ID: 22

PKL Electricity-A New and Innovative Idea for an Indirect Galvanic Cell(IDGC)

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Abstract:

This work represents a new approaches for the production of bioelectricity from citrus PKL extract an indirect galvanic cell (IDGC). In this research paper, it has been designed and fabricated a PKL (Pathor Kuchi Leaf) unit cell for practical utilization in Bangladesh. It has been studied the open circuit voltage, load voltage, short circuit current, load current, internal resistance, Maximum power and load power. The study period was long and it was 23000 hrs. It is shown that the maximum open circuit voltage was 0.99 Volt and the minimum open circuit voltage was 0.85 Volt, the maximum load voltage was 0.95 Volt and the minimum load voltage was 0.81 Volt, the maximum short circuit current was 4.14 mA and the minimum short circuit current was 2.42 mA, the maximum load current was 3.12 mA and the minimum load circuit current was 1.41 mA, the maximum internal resistance was 236.71 ohm and the minimum internal resistance was 351.24 ohm, the maximum power was 4.06 W and the minimum maximum power was 2.06 W and the load power was 2.96 W and the minimum load power was 1.14 W. The performances and different electrical parameters have been studied. It is shown that the voltage has been increased by increasing the number of cells in a series combination where the current remains constant. It is also found that the current has been increased by increasing the number of cells in a parallel combinations while the voltage remains constant.

Keywords: Indirect galvanic cell (IDGC), Electrochemical cell, PKL electricity, open circuit voltage, Short circuit current, internal resistance, Maximum power

Paper ID: 48

Fully Digitalized Fingerprint and RFID Based Voting System

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Abstract:

In the current ongoing times, most of the nation's conduct their elections using Electronic Voting Machines (EVM's), where your vote to be stored electronically and registered using electronic devices from which little to no wastage of ballot paper takes place. As security is one of the major parameters to be considered during an election that no individual can vote twice or misuse their right to vote, this can be prevented using Fingerprint and RFID technology, as the minutiae feature on the finger of each person is dissimilar, the elector can be easily identified and distinguished from others. The machines permit the person to cast the vote with his fingerprint, the fingerprint of the voter is used to uniquely and distinctively identify the person using the fingerprint module, also the system will only allow the user to use the machine once if the voter tries to use the machine again it will indicate an error. An admin will be assigned to the group of voters standing for the election. The operator only will have the access to delete or add the voter's photo and name. Admin will also authenticate the details of the candidates by proving the voter's identity after verification operator will give the identity card so that the voter can cast his vote at the election compound.

Keywords— RFID, EVM, Fingerprint verification.

Paper ID: 26

Simplified Approach for Model Identification of Non-Reheated Turbine of Load Frequency Control

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Abstract:

Through Load Frequency Control (LFC), we Control the load and frequency of the power system to operate and control the valid forms of the system through frequency. Herby, many conditions of load frequency control are observed and its behavior is shared by mathematical modeling. As long as, LFC has intricate circuit and according to the mathematical modeling of the LFC, this is supposed to be a higher order transfer function. According to which in this paper the third-order equation of the LFC is reduced to its order by using the model order reduction (MOR) technique of different techniques. Six different model order reduction- schemes of the LFC's non-reheated turbine have been applied to represent multiple parameters in the time and frequency domains. Therefore, the system engineer has to be practically employed the model ordering system to execution the basic installation and control of the system. In this paper we discussed the comparative analysis of different six techniques of Model-Order-Reduction and reduced the different types of parameters of original system.

Keywords: Model reduction scheme, Integral square error, Transient response specification, Optimization, Frequency response specification

Paper ID: 37

A comparative study of sliding mode controller for non isolated DC-DC converters

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Abstract:

Appropriate DC-DC converter selection and control is a critical aspect that has a considerable impact on the overall performance of power systems. Therefore motivated by various types of converter and their control a comparative analysis of sliding mode controller (SMC) for non isolated DC-DC converter is presented in this study. In order to analyze the performance of SMC, three different types of converter are considered namely Buck, Boost, Single-ended primary-inductor (SEPIC) converter. The concept of pulse width modulation (PWM) is used to design SMC controller for these converters. It is observed that the performance of SEPIC converter with SMC is better in terms of efficiency of converter.

Index Terms—DC-DC converter, BUCK, BOOST, SEPIC, SMC

Paper ID: 43

Implementation and Analysis of CNFET based PCRAM cell using 32 nm Technology

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Abstract:

This paper demonstrates CNFET based pcram cell. In this design we are using 2 CNFET for the fast switching of resistance in pcram cell. The use of CNFET devices, possess far superior electrical characteristics than traditional MOS devices, which paves the way for such major improvements in this design metrics of the proposed cell. By giving high short duration current pulse to pcram we achieved better read and write access time, furthermore the proposed cell consumes marginal hold power @VDD = 0.9 V.

Keywords: NVM (nonvolatile memory), GeSbTe (germanium antimony terrarium), PCMRAM (phase change memory random access memory), CNFET (carbon nanotube field effect transistor), CNT (carbon nano tube).

Paper ID: 63

Short Circuit Analysis in Unbalanced Radial Distribution System considering Mutual Impedances

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Abstract:

In this paper unsymmetrical short circuit analysis algorithm for unbalanced radial three-phase distribution networks, based on two matrices is presented. Two matrices, the bus-current-injection-to-branch current (BIBC) matrix and the branchcurrent-to-bus-voltage (BCBV) matrix for each phase are used to represent the special topological characteristics of distribution networks. These two matrices for each phase are built by simple building algorithms and are easily implemented. Most of the short circuit computation methods in literature neglect mutual impedances between the phases. This paper computes the short circuit currents considering the mutual impedances between phases by building two new BIBC and BCBV matrices per phase. This improves the accuracy of the short circuit computation and also simulates the practical distribution system (DS). The proposed short circuit analysis method is applied to 55 bus system and the results are summarized.

Paper ID: 64

Cooling of a high concentration solar photovoltaic module based on finite element analysis

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Abstract:

High concentration solar photovoltaic (HCPV) module has become one of the leading areas of research in modern day photovoltaic technology, although this technology might be a cause of heat increment inside the PV module. This excessive heat can create an efficiency loss and irreparable structural damage in permanent basics. Additionally, due to this high temperature rise, a sharp decrease in maximum output power can also be produced. Therefore, it becomes an essential task to decrease its overall temperature for the safety of the PV panel. To eliminate this defect this study shows a 3-D numerical simulation approach by introducing a finite element analysis method (FEM) to analyze the heat distribution inside the photovoltaic panel by taking a passive thermal regulation technique called fin based heat sink. The added heat sink is designed by a suitable ribbed fashioned wall, comprehended with a thermally conductive material called aluminum. To analyze the heat picture three different meshing structures has been taken care of, i.e. rectangular, tetrahedron and hex dominant through FE analysis approach. The simulation result reveals a decrease in almost 6°C due to heat loss between the PV panel and heat sink's upper surface. This self-cooling arrangement would significantly enhance the life span of the solar panel by conforming the growth in energy harvesting sector to develop an eco-friendly society.

Keywords:- *Solar PV, HCPV, heat sink, cooling, mesh variation, FEM*

Paper ID: 67

Fast Locking Low Phase noise Prescaler Based Integrated PLL for High Speed Wireless Application

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Abstract:

In this article we have focused mainly on Fast Locking Low Phase noise integrated PLL for high Speed Wireless Application by incorporating novel prescaler architecture which helps to attain a faster lock in time of 2 μs at higher with a power consumption of 2.3 mW, at an operational frequency of 2.4 GHz and phase noise is measured as -100.997 dBc/hz at 10Mhz offset frequency.

Keywords: Prescaler, Phase Locked Loop (PLL), VCO, output noise, Lock in time, dead zone.

Paper ID: 65

Reconfigurable Processor for Control System, Application

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ABSTRACT

The aim of The Reconfigurable Processor is optimized for control systems and eliminate the drawbacks of FPGA, DSP-Processor, ASIC-SOC. ASIC-SOC offers low power Consumption, highest possible performance at a lowest silicon cost but Flexibility is too low. DSP processor has efficient instruction level pipelining by incorporating Harvard Architecture. Some DSP processor is using very large instruction word (VLIW) architecture, so memory size Increases. Large memory bandwidth for long instruction fetching also becomes a bottleneck in implementing off-chip memory. And FPGA consist of CLBS (configurable Logic Block). To realize a function a large no of CLBS need to be interconnected and resulting complex routing structure consequent interconnection delay.And performance and flexibility are achieved at very high silicon cost. Keeping these factors in view flexibility and reconfiguration latency, high performance, scalable, low power consumption is achieved by reconfigurable Processor

Keywords: PID CONTROLLER,ARCHITECHURE OF PROCESSOR

Paper ID: 68

Magnetoelectric Ring Sensor - Modeling and Experimentation

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***Abstract*:**

The article presents a theoretical model of the magnetoelectric ring sensor. The MSE errors between the ex- perimental measurements and the theoretical model as well as MLP and SVR were compared.

Index Terms—magnetoelectric ring sensor, theoretical model, MLP, SVR

Paper ID: 66

Face Detection and managing attendance by using Raspberry Pi

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Hyderabad, Telangana .

Abstract:

The management of attendance in our everyday life in schools, colleges is a complicated task for teachers especially for the group of students if it is done by hand. To overcome this problem. The real time execution of the algorithm with enough correctness is needed, with hardware timing into reflection. The real time execution of the algorithm with enough correctness is needed, with hardware timing into reflection.we proposed face recognition using raspberry pi for attendance management system by using this system, we can reduce the chance of getting proxy attendance. The attendance being marked using live stream video using open cv by using the framework comprises of four stages database creation, face detection, face recognition, and attendance updation.First, the image of the student is captured throughthe live stream video. Then at the point with the images in attendance in the database. Assumming that the match is observed attendance is noticeable as present else absent.

Keywords: Raspberry pi, face recognition, face detection, attendance updates, database

Paper ID: 69

A Non-Contact Opto-Electronic Liquid Level Transmitter for a Conducting Liquid Using MZI Technique

Moumita Chakraborty, P.K. Sadhu

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ABSTRACT

Accurate and reliable measurement and transmission of liquid level in a storage tank is very important in every industry. The transmitted electrical signal from a liquid level transducer or any other transducer to a remote indicator or controller may sometimes suffer from measurement error due to its contamination with noise signal. This may be easily avoided by using modern optical fiber communication technique where the electrical signal from the transducer is converted into optical signal by a suitable technique. In the present paper, an opto-electronic liquid level transmission technique of a conducting liquid in a storage tank is developed and studied. The transducer is an accurate non-contact modified capacitance type unit used for a conducting liquid where various types of measurement error observed in a conventional capacitive unit, are eliminated by using an op-amp based electro-optic technique. In this technique, the analog electric output of the proposed level transducer is converted into an optical signal by using a Mach-Zehnder Interferometer (MZI) based electro-optic system. This optical signal may be transmitted accurately to a remote location through a fiber optic cable.. A prototype unit of the proposed opto-electronic system is designed, developed and functionally tested in the present work. The experimental results are reported in the paper. A good linear characteristic of the normalized optical output is obtained.

Keywords: Conducting liquid level, non-contact, capacitance, opto-electronic transmission, MZI, Op-Amps.

Paper ID:60

Intrusion Detection and Classification in Wireless LAN using Data Mining Techniques

K Rama Krishna Reddy

Asst. Professor
Department Of CSE
KG Reddy College of Engineering and Technology, Moinabad,Hyderabad, Telangana

Abstract:

The traditional security systemss are by no means enough to create a securedIT infrastructure, Intrusion Detection Systems (IDSs), which observe the flow of system works and detect intrusions, are usually used to complement other defense techniques. However, threats are becoming more powerful and strong, with attackers using new attack methods or modifying existing ones. Furthermore, developing an effective and robust Intrusion Detection Systems is a challenging research platform due to the environment resource restrictions and its constant evolution. This work has a core objective of designing a model for protecting wireless local area network through data mining techniques. Protection from unauthorized access is thus another line of defense for network technologies. The work is to use Data Mining techniques to assist the IDS construction effort to help mitigate these issues. It has been found that Intrusion Detection technologies can be implemented jointly with data mining algorithms to spot attacks. An Intrusion Detection System used to control network operations, mainly involved in detect and separate unwanted users with classification techniques. As mobile crowd sourcing technologies are applied to smart environments, planners can focus on revolutionizing the world by integrating and coordinating all of the technology resources. An effective IDS must still bring in the technical specifications of the systems being used. Additionally, these algorithms are evaluated for their use in discovering unknown attacks.

Paper ID: 70

A CMPA based cost-effective Photovoltaic power generation system and utilization

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Abstract:

The electrical demand is quickly increased, and renewable energy sources are an indispensable need for supporting the electric grid and supplying isolated loads. Renewable energy is found in numerous forms like solar energy, wind energy, tidal energy.The solar power system is clean, and large amounts of solar radiation arrive at the surface of the earth.Photovoltaic (PV) systems are taking a leading role as solar-based energy sources because of their unique advantages. But in this, the cost of power generation is an important issue since the existing research methods aren't effective. So that this research methodology uses the CMPA based cost-effective PV power generation system and utilization. In this research, first, the design variables, constraints, and the PV modelling is explained. After that, the objective function is determined here. The main objective function is the generation of the cost function and the power loss function. At last, the cost-effective power generation system is designed by the CMPA. In this CMPA, the determined objective functions are considered as the fitness function and the input are the design variables. In experimental analysis, the performance of the proposed methodology is analyzed with the existing research methods based on the performance metrics and the proposed attains better performance than the existing methodologies.

Key words: *Photovoltaic (PV), Cost-Effective, objective function, power loss function, and Cognitive Marine Predators Algorithm (CMPA).*

Paper ID: 60

Intrusion Detection and Classification in Wireless LAN using Data Mining Techniques

K Rama Krishna Reddy

Asst. Professor
Department Of CSE
KG Reddy College of Engineering and Technology, Moinabad,Hyderabad, Telangana

Abstract:

The traditional security systems are by no means enough to create a secured IT infrastructure, Intrusion Detection Systems (IDSs), which observe the flow of system works and detect intrusions, are usually used to complement other defence techniques. However, threats are becoming more powerful and strong, with attackers using new attack methods or modifying existing ones. Furthermore, developing an effective and robust Intrusion Detection Systems is a challenging research platform due to the environment resource restrictions and its constant evolution. This work has a core objective of designing a model for protecting wireless local area network through data mining techniques. Protection from unauthorized access is thus another line of defence for network technologies. The work is to use Data Mining techniques to assist the IDS construction effort to help mitigate these issues. It has been found that Intrusion Detection technologies can be implemented jointly with data mining algorithms to spot attacks. An Intrusion Detection System used to control network operations, mainly involved in detect and separate unwanted users with classification techniques. As mobile crowd sourcing technologies are applied to smart environments, planners can focus on revolutionizing the world by integrating and coordinating all of the technology resources. An effective IDS must still bring in the technical specifications of the systems being used. Additionally, these algorithms are evaluated for their use in discovering unknown attacks.

Paper ID: 71

IR and Visible Image Fusion using DWT and Bilateral Filter

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Abstract:
Image fusion is a process to combine or fuse various images captured from different sensors, different viewpoints, multi-focused, multi-exposure, etc. The fused image is capable of providing the complementary information captured from different images. In this, manuscript a novel procedure of an infrared and visible image fusion methodology is proposed. The proposed image methodology makes the fused image better for human vision and machine vision. by merging significant features from source images. The presented approach uses Discrete Wavelet Transform (DWT), and bilateral filter to fuse information received from different input images. A bilateral filter is an edge-preserving and smoothing filter and also an extension of the standard Gaussian filter. DWT is used to decompose the image into a series of coefficients, falling in different frequency bands. The "low-frequency" sub-bands and "high-frequency" sub-bands are treated in a dissimilar manner and a different fusion strategy is proposed for combining. The final image is reproduced using inverse discrete wavelength transform (IDWT). The final fused image shows prominent results, and it outperforms as compared to similar available existing techniques.

Paper ID: 72

Analysis of a Solar Photovoltaic Cell Array Characteristics Using MATLAB Simulink Tool

Divya Bharti[1], Girdhar Gopal[1], Arun Kishor Johar[1,2,*], Yogendra Kumar Upadhyaya[2], Ashutosh Tripathi[2], Tarun Varma[1]

[1]Department of Electronics and Communication Engineering, Malaviya National Institute of Technology Jaipur, Rajasthan, India
[2]Department of Electronics and Communication Engineering, Chandigarh University, Gharuan, Mohali, Punjab, India

Abstract:

Using mathematical modal, A model of a solar cell's triple layer is developed on MATLAB Simulink software. Triple layer solar cell has high efficiency system. Photovoltaic characteristic curves are produced using a mathematical model using a MATLAB Simulink modal. The performance characteristics of power voltage or current voltage of photovoltaic modules are investigated by variation of the solar irradiance and temperatures environments. The various maximum power-point system approaches are presented in the study paper. Photovoltaics have a peak power output in every circumstance, therefore studying the peak power monitoring of photovoltaic modules in solar missile systems is crucial. The properties of photovoltaic cells are generally determined by a nonlinear mathematical equation that is difficult to solve analytically.

Keywords— Triple layer solar cell, Photovoltaic, nonlinear mathematical equation

Paper ID: 76

EM-wave attenuation model in Tropical Atmospheric conditions: A Physics based non-linear particle scattering theory for studying variable fog density in Terahertz – Communication

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[2]Department of Physics,Adamas University, Kolkata 700126, India.

Abstract:

The propagation of millimeter-wave and sub-millimeter wave signals is affected by absorptive and dispersive processes in the atmosphere. The resulting attenuation and temporal group delay increase in unfavourable weather conditions. The loss of signal power due to scattering of electromagnetic waves in free space, is one of the most common type of hazard in ultrafast wireless communication systems. Primarily the existence of suspended atmospheric particles, which are commonly referred to as aerosols, is responsible for this scattering mechanism. The authors in this paper, have presented a comprehensive analysis of terahertz (THz) signal attenuation owing to different types of atmospheric scattering mechanisms in Indian subcontinent under tropical climatic belt. The frequency-dependent properties of the signal attenuation have been analysed using an indigenously developed Non Linear Terahertz Attenuation Model (NLTAM). Incorporating newly created computer programs in this model (NLTAM), the extinction parameters and the rate of attenuation of the Terahertz wave have been determined within fog, which is the most common type of aerosol. The variations of attenuation-rates of THz signal with frequency have also been simulated under radiation fog-scenario and presented in this paper. The findings show that for multiple-scattering from fog-based aerosols, the peak-attenuation level decreases from the same for single-scattering outcome. The nature of THz signal attenuation spectra in foggy atmosphere, agrees closely with experimental findings of the same, for near THz or IR signal transmission in adverse weather scenario in non-tropical regions. For the first time, the authors have employed a novel technique to initiate a comparative prediction of attenuation of THz wave under different types of scattering mechanisms with an emphasis on foggy atmosphere under tropical climatic region.

Keywords: Terahertz, Mie-Theory, Extinction Coefficient, Radiation-Fog, Absorption, Multiple Scattering

Paper ID: 73

FEM Modeling and Performance Evaluation of a Flexible Film Bulk Acoustic Resonator

Arun Kishor Johar[1,*], Jai Kumar Bhatt[2], Yogendra Kumar Upadhyaya[1], Ashutosh Tripathi[1], Gaurav Kumar Sharma[3], C. Periasamy[2], Tarun Varma[2], Dharmendar Boolchandani[2], and Ajay Agarwal[4]

1 Department of Electronics & Communication Engineering, Chandigarh University, Mohali, Punjab, India
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3Department of Electronics & Communication Engineering, GLA University, Mathura, Uttar Pradesh, India
4Department of Electrical Engineering, Indian Institute of Technology, Jodhpur, Rajasthan, India

Abstract

In this article the F-FBAR device is designed by placing a piezoelectric material (PZT) between two metal (Al) electrodes on the top of a Bragg's reflector structure (Bragg's reflector is composed by placing high & low acoustic impedance materials stacked one over another) and this Bragg's reflector configuration is mounted on a flexible substrate (polyethylene terephthalate (PET)). The resonance properties of a F-FBAR have been investigated through finite element method (FEM) simulations. The effects of acoustic impedance layer thickness variation on the sensor efficiency have been studied. This study gives new idea in designing of high-performance F-FBAR sensors. It is also reported that if the bottom electrode is placed just above the high acoustic impedance layer (W) than it provides coupling coefficient enhancement whereas if bottom electrode is placed just above the low acoustic impedance layer (SiO_2) than it results in quality factor enhancement of the device.

Keywords: flexible film bulk acoustic resonator (F-FBAR), polyethylene terephthalate (PET), micro-electro-mechanical system (MEMS), finite element method (FEM), Bragg's's reflector, piezoelectric material (PZT).

Paper ID: 77

Design of a 2.45GHz Cascode Low Noise Amplifier with π Matching Technique

Shubham Kumar, Satyam Saraiyan, Abhinit Saurabh, Shashank Kumar Dubey, Santashraya Prasad and Aminul Islam

Dept. of ECE, BIT, Mesra, Ranchi, India

Abstract:

In this paper a Low Noise Amplifier (LNA) working at 2.45 GHz frequency which lies in ISM frequency band is demonstrated. Proposed LNA uses the cascoded topology with constant current source biasing methodology. This biasing technique is used to control the current flowing in the circuit so as to reduce the power consumption and cascoded stage is used to improve the gain of the LNA. Proposed topology of LNA is realized on 180-nm CMOS technology and all simulations are done using cadence virtuoso tool. Since LNA is a first active block of receiver system so we have tried to make the noise figure as low as possible while maintaining other parameters in acceptable range. The simulated results show that the proposed structure is able to provide the very low noise figure of 1.729 dB while maintaining the gain ($S21$) of 16.34 dB. We are also able to achieve a good input matching ($S11$) of −26.82 dB and output matching ($S22$) of −21.7 dB at input and output port respectively. Because of cascoded stage we are able to achieve good isolation between input and output port ($S12$) of −49.04 dB. The proposed topology shows a very good stability over the range of frequency which can be verified by the stability factor (Kf) of 2.331 (>1) and ($B1f$) of 0.019 (<0). Our proposed LNA circuit consume very less power of 5.2 mW.

Index Terms— Low-noise amplifier (LNA), noise figure (NF), S-parameters, biasing, matching.

Paper ID: 75

Natural convective heat transfer and entropy generation characteristics for the flow of MWCNT-Fe_3O_4-water nanofluid inside a wavy solar power plant

Sumit Kumar Mehta[*, 1], Pranab Kumar Mondal[2]

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Abstract

In the present study, we have numerically investigated the natural convective heat transfer and entropy generation characteristic inside a wavy solar plant filled with MWCNT-Fe_3O_4-water nanofluid using the finite element method. The computed flow and temperature field are investigated in terms of streamline contour, isotherm contour, local Nusselt number, average Nusselt number, dimensionless total entropy generation, and dimensionless average total entropy generation by varying the dimensionless amplitude of the wavy wall and nano-particle volume fraction. We reported that the presence of a wavy wall and the addition of nano-particles decreases the recirculation strength. Moreover, the increase in the amplitude of the wavy wall and nano-particle volume fraction enhances the average Nusselt number. The viscous entropy generation is dominated for the considered value of the Rayleigh number. In addition, the increase in wave amplitude and nano-particle volume fraction reduces the average entropy generation.

Keywords: Natural convection, solar plant, wavy wall, Bejan number, entropy generation.

Paper ID: 74

Speaker Recognition Using 3D Convolutional Neural Network AND GMM

Manoj Rajput[1], Krishna Chauhan[1], Girdhar Gopal[1], Arun Kishor Johar[2,*], Ashutosh Tripathi[2], Tarun Varma[1]

[1]Department of Electronics and Communication Engineering, M*alaviya* N*ational Institute of* T*echnology* Jaipur, Rajasthan, India
[2]Department of Electronics and Communication Engineering, Chandigarh University, Gharuan, Mohali, Punjab, India

Abstract:

Speaker recognition(SR) is process of identifying and verifying the human voice which is one of the most convenient biometric characteristic of human identity. There are many important applications for speaker recognition technology including terrorist tracking, identification of suspects and detection of a person at a remote location in the area of surveillance and identification of person for phone banking and credit card transactions in the private sector. Telephone and telephony network offer a natural way for this application. In this project we have implemented two speaker recognition task each one uses completely different method to verify speaker : 1) Speaker verification using 3D convolution neural network 2) Speaker identification using GMM(Gaussian Mixture Model). Most applications where voice is used to verify speaker ID are classified as speaker verification. In the training phase, the network is trained to distinguish between the different speaker signals to create a background model. One of the most important parts is to create speaker models. Many previous methods create speaker models based on averaging the speaker representation given to the background model known as d vector method. In our project, we propose a flexible feature reading using 3D-CNNs in creating a direct speaker model on that, in both the development and enrolment stages, the same number of utterances per speaker is provided by the network to represent the speaker's speech and structure. This leads to simultaneous retrieval of information related to speakers and to create a very powerful system to deal with internal speaker variations. We show that the proposed method goes far beyond the traditional d-vector verification system. We have also implemented a traditional method for speaker identification. The method gives us the accuracy of 97 %. This speaker identification uses GMM(Gaussian Mixture Model).

Index Terms—3D cnn, Gaussian Mixture Model, MFCC , Speaker Recognition

Social Security:
Different Levels of Securities

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Introduction:

Providing social security is the concept of setting measures and precautions for the neighbors of a locality. When dangers come from different levels and damages are happened in any locality, then, it is very hard to trace the source of criminals. There are some attacks which come from top level and after passing many levels it finally executes to the target. This writing discusses some concept of multilevel based attacks, related precautions, disinfecting the corrupted resources hired by intruders and developing awareness about multilevel based attacks.

What are multilevel attacks?

When the attacker does not execute any damage directly but takes help of people (or resources) of different levels to hide the original planner is known as multilevel attacks. Say, 'A' has planned to kill a person within the region of 'C', so, 'A' will hire one or more persons of 'B' region and 'B' will pass necessary information to 'C' for execution. With the help of a diagram, the concept is explained:

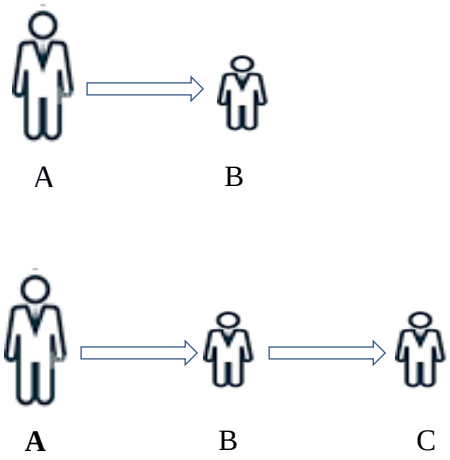

Figure-1: (a)two levels of network and (b)three levels of networks arranged by attackers.

In above figures 1(a), 'A' is known as planner and 'B' is executor. In figure 1(b) of three persons, 'A' is planner, 'B' is hired person and a sub planner, 'C' is executor. In both of cases, 'C' is executor and may be a person or an automated system like; bomb bursting remote circuit, automated firing device, car bomb with timer or any biological weapon which infects with time and weather etc. In case of automated system of 'C', it becomes harder to trace or find source of 'B' and 'A', because, after action, 'C' is fully damaged and scattered where forensic investigation may find causes of explorations but tracing network link of 'B' and 'A' is the hardest job.

Properties of B: he is hired or trained and motivated to do some attacks. If 'B' is a paid person, he will wait for collecting evidence of damage or explosion which will ensure his rest payment. If 'B' is a member of a political party or a member of a terror organization motivated politically, he will not wait to collect evidences of damages. He will collect information from other sources like TV, Radio, paper news etc. The most intelligent network designing depends of 'B', if 'B' is a flying man or a roaming man who changes his position time to time, then, investigation of explosion(as example) becomes hardiest.

Delinking Network: In fig-1(a) there is one link as A-B; if it is thought from the concept of communication technology, there are two channels of communication between A and B and these are A-B and B-A known as uplink and downlink. It means, before attacks, both channels remain active

for setting plan of execution, but, after execution, either both channels or one channel is delinked or destroyed for hiding information about source of attackers. In figure-1(b), there are two links A-B and B-C, it is assumed that there is no communication between A-C as because, 'A' has hired 'B' to execute with the help of 'C'. In this network 'A' wants to remain as hiding himself. When all plans and execution rights are handed over to 'C', then 'B' may delink the link B-C and A may delink A-B or they may delink both up and down channels as shown below.

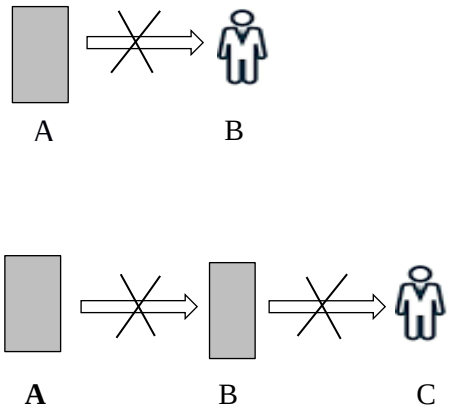

Figure 2. (a)after completion of attacks A disappears and link of A-B is disconnected. (b) a model of hiding A and B and disconnecting links of A-B and B-C.

Gathering information:

Collecting information about suspected persons or events is a legal work. Have we permission to collect data and store in a Server of computer of a person or a locality? Can we process data for finding facts? If so, a database is required to create with many data files with different column heads. For setting precautions of any attacks or accidents which may happen over a stage or market place, some measures are suggested below. A possible schema of a data-table of stage/locality where any event will be organized is mentioned below:

Stage_type: may be at play ground, inside a open Banquet, on a permanent stage

Background: cemented wall/false wall/cloth-cover/open

Under_stage: open/covered sides/cloth-cover/

Rightside: open/cemented wall/covered sides/cloth-cover/

Leftside: open/cemented wall/covered sides/cloth-cover/

Top: open/covered sides/cloth-cover/contents of top

Outside_of_stage: gas/kerosin-oven/welding machine/open-road

Load_capacity: tested/person capacity/overload-control-by-whom/

Hanging_Fan: tested/permanent or not/temporary hanging/

Conclusion:

Here, some information is compiled, but not limited to. These are some primary investigative points which should be checked by security personals or volunteers before performing and event. It is suggested to gather these information either as manually or automated and structured way to storing within a computer system. Awareness starts from discussion level and then gradually takes into automated system. The organizers of the event and the participants all should be aware about their securities; if people become awarded the possible dangers, then only volume of damages will be minimized.

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