Proceeding of

Micro2021

8th International Conference on

Microelectronics, Circuits & Systems

08th and 09th of May, 2021

Organizer:

Applied Computer Technology

Kolkata, West Bengal, India.

www.actsoft.org

In Association with:

International Association of Science, Technology and Management

Micro2021

8th international conference on

Microelectronics, Circuits and Systems

May 08th and 09th 2021

Venue: Online conference

Proceeding Book with abstract of papers

Published dates: 08th May 2021

Published by: Dulal Acharjee, Director, Applied Computer Technology,

53 Teachers' Colony, Agarpara, Kolkata-700109, India

University of Calcutta

UNIVERSITY COLLEGE OF TECHNOLOGY
INSTITUTE OF RADIOPHYSICS AND ELECTRONICS

Telephone: (+91) (33) 2350-9115/9116/9413
Telegram: INRAPHEL
Fax: (+91) (33) 2351-5828
E-mail: abiswas5@rediffmail.com

SISIR MITRA BHAVAN
92, Acharya Prafulla Chandra Road
Kolkata – 700009, INDIA

WELCOME FROM THE GENERAL CHAIR

It is a great pleasure for me to have been invited to serve as the General Chair (Publications) in the 8th International Conference on *Microelectronics, Circuits and Systems* (Micro2021) to be held during May 8 - 9, 2021 using virtual platform in India. Since the second wave of COVID-19 pandemic has been creating catastrophe to almost all parts of our country including Kolkata, we have the only option to organize Micro2021 entirely online to ensure safety of the participants and organizing committee members.

The Micro conferences had distinguished scientists who served as past Chairman, General Chair, and I wish to thank them all for the great legacy that has significantly improved the quality of the conference. On behalf of the entire team Micro2021, I would like to welcome all the participants, speakers, delegates in the Micro2021. This conference is committed to provide the scientific community an excellent platform for presenting the most recent developments and the state of the art in the domain of microelectronics, devices, circuits, VLSI and optoelectronics, and also other associated areas. The Micro2021 will feature presentation of high quality contributory papers received from various premier institutes in India including National Institute of Technology, State and Central Universities and some papers from Bangladesh. Although we received a total of 48 submissions, the number of accepted papers has been restricted to only 30 on the basis of reviewers' comments. Most importantly, the conference will include deliberations by renowned speakers from different countries including Israel, Poland, Bangladesh, etc. covering the theme of the conference and beyond. Furthermore, you will be happy to learn that most of papers presented in the Micro2020 have been published in Springer Lecture Notes in Electrical Engineering (LNEE). We have already initiated the same procedure so that papers presented in Micro2021 may be published in the Springer LNEE subject to compliance with Springer guidelines.

It is again my great honor and pleasure to extend a hearty welcome to everyone attending the Micro2021 and helping to celebrate our 8th year.

Abhijit Biswas
Professor & Head
General Chair (Publication), Micro2021

Index

Session-I

Session-II

Session-III

Session-IV

Session-V

Session-VI

Session-VII

Keynote Talk:

Photonic means for failure analysis of integrated circuitry

Maor Tiferet, Nadav Shabairou, Eran Gur, Moshe Sinvani and Zeev Zalevsky

Faculty of Engineering & the Nano-Technology Center, Bar-Ilan University, Ramat Gan, Israel

ABSTRACT

In this presentation we will present several concepts for improving the imaging resolution while analyzing VLSI circuitry during the process of failure analysis of microelectronic chips (integrated circuitry).

The presentation will be divided into two parts. In the first we will discuss new numerical approach for improving the resolving power of low-resolution images which is based upon numerical iterative comparison between low resolution experimentally captured image and high-resolution layout image of the same region of interest. The proposed algorithm will be applied on the images themselves as well as on their Radon transform.

Since the VLSI images are expected to have sharp linear features, the Radon based transformation improves the ability to reconstruct data even more than the improvement obtained when the iterative concept is applied on the experimentally captured images themselves. Experimental investigation demonstrated an improvement in resolution by more than a factor of two when the iterative approach was applied on the images themselves and additional improvement in resolution of 4%–8% for actual specimens, and up to 220% for some test cases, was obtained in the enhancement involving the usage of the Radon transform.

In the second part of the talk, we present a scanning super resolving novel imaging concept using the plasma dispersion non-linearity occurring in silicon chips and which allows improving the resolution up to the nanometric limit. We will present the ability to probe the silicon with high and even sub-wavelength resolution on its surface as well as under the surface. It may serve as a very important tool in the field of nano electronics such as integrated circuitry (IC) failure analysis. It can also serve for detection of nano defects in silicon wafers, for optical sensing of programmed charges in ICs and other semiconductors inspection industry.

The super-resolved process includes scanning the wafer with two beams- pump and probe. The pump beam is absorbed in the silicon (since it is in the visible range) and creates temporally, free charge carriers pattern in the silicon. Following the plasma dispersion effect occurring in silicon and in proportion to its spatial intensity distribution, the pump laser beam shapes the point spread function of the imager by controlling the lateral transmission and dispersion of the probe beam (which is in infra-red wavelength and is not absorbed in the silicon).

The usage of shorter pulse width for the pump laser having a donut lateral shape, allows us to reduce the point spread function of the probe beam by several orders of magnitude. In addition, the penetration depth of the pump beam in the silicon is large (due to using the pump beam in longer wavelengths, closer to the absorption edge of the silicon), which allows shaping the probe beam deeper in the silicon. This shaping method allows overcoming the diffraction resolution limit for silicon nanoscopy on and deep under the silicon surface depending on the wavelength of the pump laser and its pulse duration. The pulsed beam allows us not only improving the spatial resolution but also understanding the different temporal effect occurring in the silicon wafer.

Keynote Talk:

Microbolometer based Un-cooled IR Imaging Arrays

Raghvendra Sahai Saxena

Solid State Physics Laboratory, Lucknow Road, Timarpur, Delhi-110054

Sensors and detectors allow sensing the nature beyond the biological capability of human beings. Such kind of enhanced capabilities are very useful for exploring and controlling the natural phenomenon for the betterment of mankind. From the very beginning, humans are making all possible efforts to develop sensors to aid the human sensing. Out of various such sensors, the infrared sensors not only provide the capability of seeing in dark by sensing the wavelength which is invisible otherwise to human eyes, but also provide several advantages in a variety of military and civilian applications.

In the domain of infrared detectors, microbolometer based un-cooled thermal detectors are very attractive as they provide low cost, lightweight, compact, rugged and high reliability option compared to their cooled competitor although they have relatively lower sensitivity and slow response. These microbolometers are fabricated on a hanging membrane using MEMS (Micro Electro Mechanical Systems) technology, usually on Silicon substrate, supported only by the designed support legs/structures. The support structure not only provides mechanical support but also provides the required electrical and thermal path.

The IR radiation falling on the microbolometer element is absorbed and the temperature of the elements rises, which in turn changes its resistance in proportion to the intensity of the incident radiation. An array of such elements may be used for form the images of the scene from which the IR radiation is collected and focussed on the array by appropriate IR optics. To read the sensed information by the sensing elements, a readout integrated circuit (ROIC) fabricated using standard CMOS technology is used since getting physical connections from all the elements is not practically feasible. In fact, the microbolometer elements are actually fabricated directly on CMOS ROIC wafers by post processing.

Thus, the development of micrbolometer based image sensing array is a three step process, first development of microbolometer element array fabrication technology, second is the development of compatible ROIC based on the performance parameters of the fabricated microbolometers and finally, the fabrication of microbolometer arrays on the ROIC.

In the present talk, the development of Titanium based microbolometer arrays at SSPL, Delhi, their characterization, ROIC development and testing will be discussed.

Keynote Talk:

Invited Talk:

Precision agriculture using the Internet of Things

Dr. Debashis De

Professor, Department of Computer Science and Engineering,
Senior Member IEEE ID 92923377, CSI ID: I1501554
Maulana Abul Kalam Azad University of Technology,West Bengal
BF-142, Sector-I, Kolkata-700064.

In the recent past, the agriculture and farming industry has become the precision network connectivity of sensors with a new dimension of Internet of Things (IoT) technology. The cloud computing and wireless sensor network- (WSN) based extensive distance network in IoT can be applied to the agriculture and farming industry in a remote area. We propose scalable wireless sensor network architecture for monitoring and control using IoT for agriculture and farming in a remote area. One of the significant managements in precision agriculture and farming (PAF) is water resource irrigation and proper utilization of water resources. Appropriate utilization of water irrigation management can be achieved by applying WSN technology using IoT. The efficient communication of various wireless sensors is processed using IoT in PAF to improve the productivity of farmers. We have analyzed the WSN structure based on throughput maximization, latency minimization, high signal-to-noise ratio (SNR), minimum mean square error and improved coverage area. The experimental results have proved that the proposed methodology provides better performance than conventional IoT-based agriculture and farming. The agriculture sector is the primary pillar of the economy of many countries and it deserves technological amelioration within a shoestring budget. Internet of Things (IoT) offers a new dimension in the major health monitoring of soil leading towards smart agriculture and farming. The amalgamation of traditional farming methodology with advanced technologies such as IoT and wireless sensor networks (WSN) can lead to sustainable agriculture. With this rationale, we have designed and developed an IoT-enhanced device – FarmFox, which can analyze the sensed information and transmitting it to the user via the internet. In comparison to the existing IoT drove agricultural solutions, FarmFox thrives in real-time data collection, soil health monitoring via in-situ analysis, and controlling the whole architecture from a remote location. Compared to existing devices, FarmFox is an economic alternative as it utilizes Arduino-based hardware. Turbidity and pH, these two parameters are first incorporated in FarmFox. The results confirm the success of soil health in terms of the four parameters. We also present a qualitative sustainability analysis of FarmFox which shows its robustness. It is expected that the real-life implementation of FarmFox will lead towards a cost-effective smart solution for Sustainable Agriculture. In the past few decades, research is going on growing plants without soil and supplying the nutrients with manual control to help farmers for high yield and less cost. The hydroponics technique was used for plants for their high growth of plants. These techniques had the problems of their high initial cost and required a trained person for the maintenance. These techniques were later interfaced with IoT for controlling the system via the internet. There was more water usage when compared to a new technique called Aeroponics. In recent years, the hydroponics technique was interfaced with machine learning algorithms which achieved accurate growth of plants based on the nutrients supplied to plants which reduced a little water usage. In aeroponics, which is reduced almost 98% less water usage when compared to the other existing techniques. Considering the yield and the growth of plants, existing technologies are discussed and an efficient approach is provided for the accurate growth of plants with less water usage and minimum need of nutrients using machine learning-based aeroponics technique with multiple input parameters like humidity, temperature, airflow, nutrients, carbon dioxide, and light intensity.

Invited Talk:

Perspectives for the Development of Electromobility in the Industry

Dr Jerzy R. Szymanski
University Professor, Faculty of Transport,
Electrical Engineering and Informatics
Kazimierz Pulaski University of Technology and Humanities,
Radom – 26-000, POLAND

The functionality of electric vehicles is often assessed by potential buyers in terms of range and speed of refueling compared to vehicles with internal combustion engines. The existing and extensive infrastructure for internal combustion vehicles is taken as obvious and it is often forgotten that it was built successively with the development of the automotive industry. A car's driving range of 400–500 km is now considered the standard for a passenger car with an internal combustion engine. While the offer of electric passenger cars with a range of 400 km is constantly expanding, fast charging is a problem due to the lack of a properly developed network of high-power charging stations, and not all electric cars can be charged with high power. However, this situation is changing rapidly. Currently, usually manufacturers of lithium-ion batteries provide the possibility of charging the battery with an hourly current of 1C or 3C, which significantly reduces the battery charging time to about 20 minutes.

The use of electric energy to power vehicles has developed to such an extent that it is justified to raise the question about electric vehicles in the industry.

The industry uses many specialized vehicles, ranging from transporting people to heavy-duty vehicles for off-road and underground work. A good example of working machines with electric drives are surface mining machines, where cage induction motors have been used for many years and powered by drive frequency converters, e.g., lignite coal excavators, stackers or conveyors with adjustable belt speed. Here, the next step in the development of electromobility is only to provide electricity from renewable energy sources. The distance covered by the mining machines is limited to the mine area, therefore they supply MV cable lines installed on an ad hoc basis using cable cars. These vehicles are so unique that they are usually custom-made and generate high purchase or modification costs. With hybrid and electric work vehicles attracting more attention, power train configurations, energy management strategies, and energy storage devices have also been increasingly reported in the literature. The electric vehicle market has not been interested in this industry so far due to the lack of available technology and the high production costs of a small number of these vehicles. In the final part of this presentation a novel type of DC/AC/DC converter was presented as an EV battery charger, in which the drive voltage frequency converter with an inbuilt output rectifier unit was used.

Comparison of Snapback Phenomenon and Physicsin Bottom and Top Body Contact NMOS

Pragati Singh[1], Niladri Pratap Maity[2], and Srimanta Baishya[3]

[1]Dept. of Electronics & Communication Engineering, National Institute of Technology, Mizoram-796012

[2]Dept. of Electronics & Communication Engineering, Mizoram university, Mizoram-796004

[3]Dept. of Electronics & Communication Engineering, National Institute of Technology, Silchar-788010

ABSTRACT

This paper compares the features and physics of snapback involved in 2-D NMOS structures having body/substrate contact at bottom and adjacent to source under the application of high current ramp at drain and zero gate voltage. We analyses the S-shaped current-voltage characteristics of two structures for understanding the snapback phenomenon and operational window of compact memory devices. This work also evaluates the carrier electrostatics involving the electron-hole carrier build up and ambipolar current flow in the body of the structures. We also investigate the formation of memory cell in the body of gate grounded MOS under high current application at the drain due to bipolar turn.

Index Terms—ZRAM, Snapback, SOIFED-RAM, TRAM.

Explicit modelling of a photovoltaic cell using Ramanujan Formula & Parameter identification with iterative method

Gourab Dasgupta, Dr. P K Sadhu
Department of Electrical Engineering
Indian Institute of Technology (ISM) Dhanbad, INDIA

ABSTRACT

This paper introduces a noble approach to explicitly express I-V relationship for a single-diode model (SDM) of PV cell. The I-V model, typically non-linear & implicit, is converted into an explicit analytical form using Taylor series expansion & Ramanujan Method of finding approximate root of non-linear equation. With this expression, influence of five unknown parameters of SDM model on voltage at open-circuit (OC), current at short-circuit (SC), Voltage & current at peak power point (MPP) and Form Factor of I-V curve is analyzed. Thereafter, five unknown parameters of SDM are extracted using a heuristic iterative method, with the help of newly formed I-V relationship and datasheet parameters. The algorithm starts with initial guess & eventually follows iterative steps to update the unknown five parameter values so that the key points (i.e Voltage at open-circuit, Current at short-circuit and both Voltage & current at maximum power point) of I-V curve match with datasheet values. In addition, the algorithm is modified, in which three vital points (*Voc, Isc, Impp*) and fill-factor (*FF*) of I-V curve is adjusted in iteration to get the best fit solution for five unknown parameters. The algorithms applied to a poly-crystalline PV module & results obtained are compared with earlier reported values under standard test condition.

Keywords: Photovoltaics, PV, Single-diode model, Explicit analytical I-V model, Taylor series, Ramanujan method, Parameter extraction, iterative approach

Detection of High-K Biomolecules Using Ge-source L-shaped Tunnel BioFETs

[1]Prarthana Chakraborti, [2]Abhijit Biswas, [3]Abhijit Mallik

[1]Department of Radio Physics and Electronics
University of Calcutta, APC Road, Kolkata – 700009, West Bengal, INDIA
[2]Department of Radio Physics and Electronics
University of Calcutta, APC Road, Kolkata – 700009, West Bengal, INDIA
[3]Department of Electronic Science
University of Calcutta, APC Road, Kolkata – 700009, West Bengal, INDIA

ABSTRACT

BioFETs have potential applications in detecting various kinds of pathogens due to their label free, and highly stable detection of biological spices with high responsivity and reliability. This paper investigates detection of different types of high-k biomolecules using Ge-source L-Tunnel Field Effect Transistor in the presence of watery medium. The entire detection scheme relies on the tunneling effect at Ge-source and Si-channel junction for introducing various types of biomolecules through the vertical arm of 'L' which is used as the cavity, the main sensing area of the device. The device characteristics are affected by the dielectric constant of the biomolecules. TCAD tool is used to obtain the results. We achieve 48.46% improvement in sensitivity using the aforesaid device which is pretty high compared to earlier reports. Our findings suggest that use of Ge-source tunnel bioFET yields far better sensitivity than Si based and many other devices reported earlier.

Keywords- Tunnel FET, biosensor, L-shaped tunnel FET, wet environment, Ge Source, voltage sensitivity.

A New Interface circuit for Improving Intrinsic Gain and Noise of the Source Follower per Detector ROIC

Manik1, Raghvender Sahai saxena2, Vandana Niranjan1

1Dept. of ECE, IGDTUW, Kashmere Gate, Delhi-110006
2Solid state Physics Laboratory, Timarpur, Delhi-110054

ABSTRACT

In this work, the basic source follower per detector readout integrated circuit (ROIC) has been modified. To do this modification, a cascode amplifier is introduced into the source follower. The use of cascade structure in the source follower will improve the noise, intrinsic gain of the proposed topology that results in the increment of the injection efficiency. The cascade structure is the combination of the amplifying (common source stage) and a cascode stage (common gate stage). In terms of complexity, the SFD unit cell is a good choice because it has only three transistors in the architecture. SFD is a simple interface topology for high density and low power ROICs. The SFD unit cell has the disadvantage of unstable detector bias voltage that makes t non-linear and increases the noise factor at the output side. The interfaced approach has been proposed here to combine the two basic unit cells. To reduce the noise factor at the output side here SFD is interfaced with the cascode amplifier stage which improves the intrinsic gain and also provides the high output resistance which helps to improve the injection of charge carriers from the detector to the interface circuit. The overall analysis is carried out on a SPICE simulator at 180 nm process technology.

Keywords: Source follower per detector, cascade amplifier, ROIC, injection efficiency. Common gate stage

Implementation of logic gates using bio-sensor model

Aranya Manna[1], Sayantan Ghorai[2], Saikat Das karmakar[2], Goutam kumar Maity[3], Subhadipta Mukhopadhyay[4]

[1]Department of Physics, Sabang Sajanikanta Mahavidyalaya, Paschim-Medinipur 721166, West Bengal, India
[2]Tamralipta Institute of Management and Technology,Purba Medinipur,West Bengal, India
[3]Department of Physics, Pingla Thana Mahavidyalaya, Paschim-Medinipur 721140, West Bengal, India
[4]Department of Physics, Jadavpur University, Kolkata 700032, India

ABSTRACT

During this paper we have a tendency implement of all-optical reversible logic gates likes toffoli gates, peres gates fynman gates etc. that is optically controlled micro resonators. For the appliance a bacteriorhodopsin macromolecule coated silica micro cavity is get connected with two tapered single mode fibre that is utilized as a optical switch and it's a occasional power signal < 200 micro watt at532 nm and at 405 nm management conformational state of macromolecule that **is** close to the infrared laser signal at 1310 otherwise 1550nm. This model is enforced optically logic gates and coated in contact with sensitive material. Advantage of this logic gates is high Q factor, tenability, compactness, low power control signal and adaptability in 2D/3D structure to create up the circuit for practically application

Keywords: reversible logic gate, computer circuit, toffoli gate, peres gate etc.

A study on Zn/Cu based pandan leaf (Pandanus *amaryllifolius*) electrochemical cell

[1]K.A. Khan, [2]Md. Sayed Hossain, [3]Salman Rahman Rasel, [4]Shahinul Islam, [5]M.Hazrat Ali

[1]Department of Physics, Jagannath University, Dhaka-1100, Bangladesh
[2]Center for Research Reactor,Bangladesh Atomic Energy Commission, Bangladesh
[3]Local Government Engineering Department (LGED), Sherpur Sadar, Sherpur, Bangladesh
[4]Department of Physics, Uttara University, Dhaka, Bangladesh
[5]Department of EEE, European University of Bangladesh (EUB)

ABSTRACT

At present there is a dire need of electricity around the world. There are a lot of remote areas where grid electricity is absent. So that some innovations are needed there for electricity production. The nonrenewable energy sources are limited. But we have a plenty of renewable energy sources. Although renewable energy sources are more safer for use in human life and the environmental pollutions. After finishing the renewable energy sources people can use sun and plants for electricity generation. In our research paper an idea has been taken for electricity production from pandan leaves because plants and leaves grow everywhere. The current and voltage has been generated from the pandan leaves which have been further used to light the LED lamp. Lighting the LED bulb proved that the idea was successful for electricity generation from pandan leaf. It is not limited to LED bulb further this idea will be used for other electric appliances. Pandan leaf (PL) has been used for getting electricity. The scientific name of the pandan leaf is Pandanus amaryllifolius. The pandan leaf extract has been used for electricity production. A comparative study has been done for both with and without secondary salt. $CuSO_4$ has been used as a secondary salt. It has been studied the several parameters like Open circuit voltage, Load voltage, Short circuit current, Load current, Maximum power, Load power and internal resistance. These parameters have been developed for both with and without secondary salt. It is shown that the performance for with secondary salt is better than the without secondary salt. The internal resistance was less for using the secondary salt. After doing this research work it can be concluded that result is positive for electricity generation from pandan leaf.

Key words: Pandan leaf (Pandanus *amaryllifolius*), Zn/Cu electrodes, Pandan leaf extract, Electricity, Secondary Salt.

Gesture Controlled Robot-Car Using Raspberry PI

Suman Kumar Pal, Afreen Bano, Ayan Jana, Mitun Kundu, and Arijit Ghosh

Department of Applied Electronics and Instrumentation Engineering
RCC Institute of Information Technology, Canal South Road,
Kolkata 700 015, India

ABSTRACT

The device handling complexity increases by integration of more functionality into Human Machine Interface. The use of different sensory channels of human, simplify the interaction with in-car devices. Robots are playing a big role in our daily lives. The existing techniques to control these robots are by using a keyboard, joystick or pre-programmed commands. This paper introduces a new way to control a robot by using the gestures of a human being. A robot-car is developed which is controlled by the gesture commands provided to the raspberry pi controller. The model has two components a car and a control station. The control station is computer that has gesture recognition hardware so that it can detect the commands and send them to the car. The control station is the microcomputer Raspberry Pi model 3B. The data from the hand movements acquired from the accelerometer sensor are fed to the motor driver L293D through the Raspberry Pi, which converts electrical energy to mechanical energy to drive the robot-car.

***Keywords*—** Microcomputer-Raspberry Pi 3B, Robot-Car, control station

Highly Reliable PMOS Pass Transistor-based Radiation Tolerant 12T SRAM Cell for Deep Space Applications

Ravi Teja Yekula, Monalisa Pandey, and Aminul Islam

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

ABSTRACT

This paper proposes a highly reliable PMOS pass transistor-based radiation tolerant 12T (PPTRT 12T) SRAM cell for deep space applications. The proposed SRAM cell achieves 17.88% improvement in Critical Charge (*Q*C), 2.19× improvement in read static noise margin (RSNM) and 1.24× improvement in read access time (*T*RA) as compared to QUCCE 10T SRAM cell at the expense of marginal (1.04×) degradation in write access time (*T*WA). The read operation of the proposed circuit is highly stable (read upset proof) because of its higher RSNM. It is also highly reliable in radiation environment because of its higher *Q*C. The theorical design of the proposed SRAM cell has been validated with extensive simulations on SPICE using 16-nm high performance CMOS technology.

Keywords—RSNM; Critical Charge; Access time; SET; SEU.

Studies on synthesis, characterization and monitoring of Ag NPs for power production using tomato

[1]K.A.Khan, [2]Farhana Islam, [3]Md. Sayed Hossain, [4]Salman Rahman Rasel

[1]Department of Physics, Jagannath University, Dhaka-1100, Bangladesh.
[2]Department of Physics, Uttara University, Dhaka, Bangladesh.
[3]Center for Research Reactor,Bangladesh Atomic Energy Commission, Bangladesh
[4]Local Government Engineering Department (LGED), Sherpur Sadar, Sherpur, Bangladesh

ABSTRACT

An aqueous extract of fresh leaves of tomato was used for the synthesis of silver (Ag) nanoparticles in this research paper. The green synthesis method has been conducted for the production of silver nanoparticles (Ag NPs) for the application of Power Production. The use of tomato in the green synthesis of nanoparticles emerges as a cost-effective and eco-friendly approach. Characterization of nanoparticles were done using different methods, which include; ultraviolet-visible spectroscopy (UV–Vis), Fourier transform infrared (FTIR), powder X-ray diffraction (XRD), field emission scanning electron microscope (FESEM). UV–visible spectrum of the aqueous medium containing silver nanoparticles showed absorption peak at around 428 nm. Fourier transform infrared spectra had shown that the biomolecule compounds were responsible for the reduction and capping material of silver nanoparticles. XRD study showed the particles to be crystalline in nature, with a face-centered cubic (fcc) structure. The power production activity of Ag NPs was assessed to find their potential use in electrochemical cell. Most of the results have been tabulated and graphically discussed. It is found that the open circuit voltage (V_{oc}), short circuit current (I_{sc}) and maximum power (P_{max}) were better for using Ag NPs from the tomato extract of a single electrochemical cell.

Keywords: Ag NPs, Synthesis, Characterizations, Monitoring, Power Production

A Wideband MIMO antenna with modified Hilbert shaped isolation structure

Anindita Bhattacharjee[1], Anirban Karmakar[1], Anuradha Saha[2]

Electronics & Communication Engg.Dept.,
[1]Tripura University(A Central University), Tripura, India
[2]Netaji SubhashEngg. College, Kolkata, India

ABSTRACT

In this communication, a compact wideband dual port multiple-input multiple-output (MIMO) antenna is presented for wireless application. It consists of two rectangular shape monopole antenna elements with rectangular dielectric resonator sharing a similar ground plane. In this design Wideband characteristics have been achieved by exciting both the monopole along with rectangular DR. To reduce the coupling between antenna elements, a modified Hilbert curve equipped with conventional rectangular structure are introduced on the ground plane which in turn establish a better isolation between radiating elements. In this design meanders line parasitic element also used to reduce the mutual coupling problems. Simulated Results show that the designed antenna gives widest impedance bandwidth (below −10 dB) throughout the operating band of 3.5–17 GHz. The antenna also produces -20 dB isolation for most of the operating band and -15dB from 4.8 to 7 GHz.

Gate All Around 22nm SOI Schottky Barrier MOSFET with High I_{ON}/I_{OFF} Current Ratio for Low Power Digital and Analog Circuit Applications

Amit Saxena[1], R.K. Sharma[2], Manoj Kumar[3] and R. S. Gupta [4]

[1]USICT, Guru Gobind Singh Indraprastha University, Sector-16C, Dwarka, New Delhi 110078, India
[2] Department of Electronics and Communication Engineering, Netaji Subhas University of Technology East Campus, New Delhi-110031, India.
[3] Department of Electronics, Shaheed Rajguru College of Applied Sciences for Women, Delhi-110096, India
[4] Department of Electronics and Communication Engineering, Maharaja Agrasen Institute of Technology, New Delhi-110086, India.

ABSTRACT

The design of low power and high-speed circuits must require a high I_{ON}/I_{OFF} current ratio. In the present work, the SOI Schottky Barrier MOSFET is investigated for low-power digital and analog circuits applications. Static power consumption, noise margins, and I_{ON}/I_{OFF} ratio in CMOS inverter and voltage gain for analog applications are computed for basic Schottky Barrier, Dielectric Pocket Schottky Barrier, and Silicon on Insulator Schottky Barrier (SOI-SB) Gate-All-Around (GAA) MOSFETs for 22nm channel length. The novel SOI-SB-GAA MOSFET offers improved noise margins (V_{IH}=0.321V, V_{IL}=0.1791V, V_{OH}=0.4498V, and V_{OL}=0.0506V) and low power consumption (0.1756µW) compared to other MOSFETs reported in this work. A resistive load single-stage voltage amplifier for analog circuit application is implemented using all three devices, and SOI-SB-GAA MOSFET offers the highest voltage gain, A_V=1.503. For the simulation purpose, ATLAS-TCAD has been used.

Keywords: SOI-SB-GAA MOSFET, I_{ON}/I_{OFF} ratio, low power, static power consumption.

Impact of Scaling on Heavy-Ion Irradiation Performance of Junctionless FinFETs

Kallolini Banerjee and Abhijit Biswas

Institute of Radio Physics and Electronics
University of Calcutta
92 Acharya Prafulla Chandra Road
Kolkata-700009, India

ABSTRACT

The effects of scaling on the heavy ion irradiation performance of junctionless (JL) FinFETs are investigated using TCAD tools at various advanced technology nodes. In addition, several heavy-ion irradiation effects of JL FinFETs are compared at different gate lengths in terms of drain current transient (I_{Tran}), and collected charge (Q_{coll}). Our findings reveal that, as the gate length (L_G) is reduced from 35 nm down to 14 nm there is a significant reduction of 30.22% and 53.4% of radiation induced transient current peak and collected charge respectively, for linear energy transfer (LET) value of 10 MeV-cm^2/mg. Moreover, the I_{Tran} and Q_{coll} are analyzed for LET values of 10, 20 and 30 MeV-cm^2/mg. It has also been observed that extremely scaled JL FinFETs are more immune to radiation while exhibiting enhanced performance in terms of faster switching speed, denser packing density and lower power dissipation.

Keywords: Heavy-ion, junctionless FinFETs, LET, scaling.

A Study on Electricity Generation from Red Spinach

[1]K.A.Khan, [2]Farhana Islam, [3]Md. Sayed Hossain, [4]Salman Rahman Rasel

[1]Department of Physics, Jagannath University, Dhaka-1100, Bangladesh.

[2]Department of Physics, Uttara University, Dhaka, Bangladesh.
[3]Center for Research Reactor,Bangladesh Atomic Energy Commission, Bangladesh
[4]Local Government Engineering Department (LGED), Sherpur Sadar, Sherpur, Bangladesh

ABSTRACT

Different plants extracts have been proven that they are the potential for electricity generation. By immerging two electrodes into the extract to allow flow of ions and then electricity is produced. Different types of electrodes anf plant leaves suggested that current and voltage are produced greater or lesser extents where Zn/Cu based electrodes and PKL extract generates the maximum power output. The results confirmed that electrochemistry is the responsible for electricity generation. LED bulb lighting system using red spinach (*Amaranthus dubius*) extract with and without copper sulfate solution ($CuSO_4 \cdot 5H_2O$). Bio-electrochemical systems show the process of electrical power generation or achieve the reduction reaction with a certain potential poised through electron transfer between the electron acceptor and electron donor. In a Zn/Cu bio-electrochemical cell, the zinc plate losses the electrons, the copper plate gains those electrons and the electrons react with H^+ and Cu^{2+}ions and eventually convert into H_2 and Cu atoms. Finally, H_2 releases from the cell and copper atoms are deposited onto the Cu plate. The experimental was conducted with and without adding copper sulfate solution $CuSO_4 \cdot 5H_2O$ with red spinach extract. A comparative study has been done for with and without secondary salt ($CuSO_4 \cdot 5H_2O$). It is found that the internal resistance has been decreased for using Copper sulphate as a secondary salt and it was from 0.347 ohm to 0.33 ohm. As a result current has been increased from 1.8 mA to 7.7 mA and obviously power has been increased from 5.76 mW to 20.2 mW.

Keywords: Red Spinach, Extract, Electricity, Secondary salt, Performance, electrochemistry

Optical performance of light-emitting diodes using InGaN/GaN MQWs with various trapezoidal bottom base widths

Himanshu Karan# and Abhijit Biswas

Institute of Radio Physics and Electronics
University of Calcutta, 92, Acharya Prafulla Chandra Road,
Kolkata-700009, India

ABSTRACT

In this work, we design and investigate the optical performance of four InGaN/GaN multiple quantum well (MQW) blue LEDs - LED A. InGaN/GaN rectangular QWs with well width of 2 nm, LED B. InGaN quantum wells (QWs) with trapezoidal bottom base width of 0.8 nm, LED C. trapezoidal wells with bottom base width of 0.6-nm, and LED D. trapezoidal QWs with bottom base width of 0.5 nm- in terms of optical output power and efficiency droop. The introduction of InGaN/GaN trapezoidal QW facilitates to reduce the piezoelectric polarization field in the LED structure. Such structures cause better envelope overlapping between electron and hole wave functions, and also uniform carrier distribution among all QWs thereby increasing the radiative recombination rate. The proposed LED C exhibits the best performance in terms of lowest efficiency droop of 4.7 % and power output of 226 mW as compared to the droop of 48.8% and power output of 70 mW at injection current of 120 mA obtained from the conventional structure, LED A.

Keywords: Efficiency droop, bottom base width, InGaN/GaN trapezoidal MQWs, light-emitting-diodes

A Compact Dielectric Resonator based Dual Port Circularly Polarised MIMO Antenna for Wideband Applications

Piyali Chakraborty, Dr. Anirban Karmakar, Dr. Anuradha Saha

Electronics and Communication Engineering Department,AEIE Dept
Tripura University, Tripura-*799022*, Netaji Subhash Engineering College
Kolkata-*700156, INDIA*

ABSTRACT

A compact Dielectric Resonator based multiple-input-multiple-output (MIMO) antenna is presented for wideband applications. The antenna consists of two modified kite shaped monopole. Four Dielectric Resonators has been used to achieve Circular polarization characteristics. Implementation of DR also helps in bandwidth enhancement purpose.Two L shaped parasitic strips along with shaped stub has been used in the ground plane so as to obtain high isolation which leads to decrease the mutual coupling between the antenna elements.The proposed antenna achieves an impedence bandwidth of 7-22GHz,low mutual coupling of less than -15dB within the entire frequency range.The antenna also achieves circular polarization characteristics at 7.5GHz respectively.

Index terms- multiple-input-multiple-output(MIMO)antenna, Dielectric resonator, wideband, circular polarization.

Implementing Machine Learning Algorithms for Predicting Roof fall Statistics in UG Coal Mines

Jitendra Pramanik [a,b], Singam jayanthu [a], Abhaya Kumar Samal [c], Surendra Kumar Dogra [a]

[a] Department of Mining Engineering, National Institute of Technology, Rourkela, India
[b] Centurion University of Technology and Management, Odisha, India,
[c] Trident Academy of Technology, Bhubaneswar, Odisha India

ABSTRACT

Roof-fall is one of the most hazardous event in any kind of underground mining operation that my impact loss of miners as well as mining machineries. Therefore, use of tools and techniques to ensure safety of miners as well as machines is of utmost priority. Though there are many factors responsible for occurrence of such catastrophic events, many of these factors are neither precisely or accurately measurable, nor are well defined, making the issue of assessment quite uncertain. Machine learning methods have been proved to be a successful tool to provide trustworthy solutions to many mission critical real-life problems. In this paper, we attempt to explore scope of applicability of various machine learning algorithms to adequately predict the occurrences of such catastrophic roof-fall events in UG coal mines due to strata control problems. This work has conducted the comparative study of the potentiality of various machine learning algorithms based on roof convergence data taken from real-life field study undertaken at GDK-10 underground coalmine.

Keywords: Underground Coal Mining; Strata Control Problem; Roof Fall; Machine Learning Techniques

Pin Diode Switch Integrated Frequency Reconfigurable Antenna: An Analysis

[1]Jayendra Kumar, *[2]Ram Kumar

[1]School of Electronics Engineering, VIT-AP University, Amaravathi,

Andhra Pradesh India.

[2]Department of Electrical and Electronics Engineering, Katihar Engineering College, Katihar, Bihar, India

ABSTRACT

In this work, the effect of biasing conditions of a pin diode RF switch controlling the performance of a reconfigurable antenna is presented. The contribution of the forward diode current and the reversed biased voltage is investigated in terms of the shift in operating band, the impedance matching, and the radiation efficiency. A significant mismatch between operating bands, impedance matching, and radiation efficiency was found for different biasing conditions as well as for the ideal and the practical switch model.

Keywords: Frequency reconfigurable antenna; Microstrip antenna; Pin diode RF switch; RF Switch biasing; RF switch model;

Heart disease risk prediction using supervised machine learning algorithms

Madhumita Pal[1,2], Smita Parija[1,*] and Ranjan K. Mohapatra[3]

[1]Electronics Science and Engineering, C. V. Raman Global University, Bidyanagar, Bhubaneswar-752054, Odisha, India,
[2]Department of Electrical Engineering, Government College of Engineering, Keonjhar-758002, Odisha, India,
[3]Department of Chemistry, Government College of Engineering, Keonjhar-758002, Odisha, India

ABSTRACT

Due to increase in population early diagnosis of chronic disease become a major problem in recent medical fields. Heart disease is one of the most dangerous chronic diseases and 17.9 million people die every year around the world due to this chronic disease. Due to the unhealthy life style most of the people in the world suffered from this chronic disease. Early detection of the disease can save the life of human being. In this paper we have presented a comparative analysis of five supervised machine learning model such as logistics regression, naïve bayes, KNN, decision tree and random forest for prediction of heart disease. The proposed model is used to predict and classify whether a patient suffered from heart disease or not. The performance of each of the model is measured in terms of accuracy, precision, recall, f1-score and support. We obtained highest prediction accuracy of 88% using random forest algorithm followed by other four algorithms such as logistics regression, naïve bayes, decision tree and KNN with accuracy of 85%,85%,81%,68% respectively. The dataset was taken from UCI repository site. It contains 303 samples and 14 features. All these algorithms were implemented on the dataset using python software and operated in jupyter notebook.

Keywords: Heart disease, Machine learning, Chronic disease, Logistics regression, Random forest, Decision tree, K-nearest neighbors

Dual Strip Flag Microstrip Patch Antenna For Millimeter Wave Applications

Purnima K Sharma, Dinesh Sharma, E Kusuma Kumari, V S D Rekha, Vivek Garg

Sri Vasavi Engineering College and Prasad V. Potluri Siddhartha Institute of Technology, Vijayawada, Andhra Pradesh, INDIA
purnima.kadali@gmail.com

ABSTRACT:

Here, a dual strip flag micro-strip patch antenna operating in the millimeter waveband for future 5G wireless communications is proposed. The antenna dimensions are 30mm X 100mm X 1.6mm including the ground plane which is fabricated on the FR4 epoxy substrate with dielectric constant 4.6 and relative permittivity 4.4. The simulation of proposed antenna has been carried by HFSS 13.0. The antenna is made to work at 22GHz, 24GHz, 35.5GHz and 38.5GHz with a return loss of -28 dB, -26dB, -17dB and -25 dB respectively. This makes the antenna suitable for the upcoming generation of wireless communication i.e. 5G. The antenna structure along with various parameters such as return loss, VSWR, radiation pattern, Current distribution, Smith Chart are discussed in this paper. The practical return loss obtained is also shown.

Keywords: millimeter waveband, 5G, HFSS, micro-strip patch antenna, VSWR.

Majority PFET-based Radiation Tolerant Static Random Access Memory Cell

Monika Rani, G. S. Namith, Shashank Kumar Dubey, Aminul Islam,

Dept. ECE, Birla Institute of Technology,
Mesra, Ranchi – 835215, INDIA

ABSTRACT

This paper presents a Majority PFET-based Radiation Tolerant (MPRT) Static Random-Access Memory (SRAM) cell. The benefit of using greater number PFETs is its high radiation tolerance. The leakage currents in NMOS access transistors increases rapidly by the radiation bombardment whereas they are not affected in case of PMOS access transistors. The proposed MPRT SRAM cell achieves 1.2 × higher critical charges as compared to the We-Quatro SRAM cell under parametric variations of 16-nm CMOS technology. Proposed circuit MPRT consumes ≈6% lower hold power as compared to the We-Quatro. It exhibits higher read stability by showing 1.5 × improvements in RSNM. The proposed cell achieves these improvements at the cost of 1.26× longer read delay and 1.22× longer write delay at nominal supply voltage.

Keywords: Radiation-hardened SRAM, soft-error, We- Quatro, Current Margin, Critical Charge, Read Static Noise Margin (RSNM), Hold Power

Optical Cryptography Using Reversible Logic Gate

Sayantan Ghorai[1],AranyaManna[2] Saikat Das Karmakar[1], Goutam Kumar Maity[3], Subhadipta Mukhopadhyay[2]
[1]Tamralipta Institute of Management and Technology,Purba Medinipur,West Bengal, India
[2]Department of Physics, Jadavpur University, Kolkata 700032, India
[3]Department of Physics, Pingla Thana Mahavidyalaya, Paschim-Medinipur 721140, West Bengal, India

ABSTRACT

It is the technology that deals with scale back to the facility utilization of the digital circuit. This style is the most promising system that condenses of warmth and power consumption. Otherwise energy reduction in digital system most probable to zero. Now a days, cryptography depends on exploitation digital system. Our paper presents, a resolution for cryptography by exploitation optically digital system. In our resolution, it's indicated that the fundamental diagram of cryptography is four input terminal and it's made Fredkin and Toffoli gate. It is primarily on MZI based reversible digital circuit.

Keywords: Cryptography, MZI, Fredkin gate, Toffoli gate etc.

Synthesis, Characterizations of Silver Nanoparticles (Ag NPs) and monitoring for power production using Drum Stick Leaves

[1]K.A.Khan, [2] Mohammad Tofazzal Haider, [3]Md. Sayed Hossain, [4]Salman Rahman Rasel

[1]Department of Physics, Jagannath University, Dhaka-1100, Bangladesh.
[2]Department of Physics, Uttara University, Dhaka, Bangladesh.
[3]Center for Research Reactor,Bangladesh Atomic Energy Commission, Bangladesh
[4]Local Government Engineering Department (LGED), Sherpur Sadar, Sherpur, Bangladesh

ABSTRACT

The drum stick fresh leaves in aqueous extract form have been used(*Moringa Oleifera*) for green synthesis of Ag NPs (Silver Nanoparticles). The green synthesis method has been conducted for the production of Ag NPs for the application in power production. Although different methods are developing for synthesis of Ag NPs for multiple applications. It is found that green synthesis from *Moringa Oleifera* leaves is cost effective and echo friendly. The synthesized Ag NPs have been characterized through ultraviolet–visible spectroscopy (UV–Vis), Fourier transform infrared (FTIR), powder X-ray diffraction (XRD), field emission scanning electron microscope (FESEM).It is found that the UV–visible spectrum contains Ag NPs in the aqueous medium and it is also found that absorption peak was at around 332 nm. It is again found from the FTIR analysis that the bimolecular compounds were responsible for the reduction and capping material of Ag NPs. It is also found that from the XRD study are the particles to be crystalline in nature, with a face-centered cubic (fcc) structure. The power production activity of Ag NPs was assessed to find their potential use in an electrochemical cell. Most of the results have been tabulated and graphically discussed.

Keywords: Ag NPs, characterization, drum stick leaf, power production, Green synthesis, electrochemical cell

Influence of Mn doping on Optical and Magnetic Properties of Transparent Mn-doped ZnO Thin Films, Suitable for Sensor Applications

Swarup Kumar Neogia* Soumyadev Ghosha, b and Sudipta Bandyopadhyayc, d

a Department of Physics, School of Basic and Applied Sciences, Adamas University, Kolkata:700126, India.
b Udaynarayanpur Madhabilata Mahavidhyalaya, Howrah 711226, India
c Department of Physics, University of Calcutta, 92 APC Road, Kolkata:700009, India
dCRNN, University of Calcutta, JB Block, Sector III, Salt Lake, Kolkata:700098, India

ABSTRACT

ZnO is a wide and direct band gap semiconductor. Optical transparency in the entire visible region of light makes ZnO thin film suitable for production of solar cells, acoustic wave devices, light emitting diodes, laser diodes. Moreover low cost and low toxicity level make it a promising material for applications in sensor devices. Present work demonstrated how transition metal doping induce modification in the physical properties (optical and magnetic properties) of Zn1-xMnxO (x = 0.03, 0.05) thin films. Measurements of structural, optical and magnetic properties have been performed and presented in this work. The films are polycrystalline having wurzite structure of ZnO. These films exhibit high transmittance in the visible wavelength region. However, absorption edge of ZnO is blue shifted when Mn is substituted at the Zn site. Both Zn1-xMnxO (x = 0.03, 0.05) films exhibit prominent ferromagnetic behavior. Further it has been observed that ferromagnetism improves when Mn doping concentrations has been increased. The observed ferromagnetism develops in Mn doped ZnO films are intrinsic in nature could be explained by using defect induced bound magnetic polaron (BMP) model, commonly used to describes the ferromagnetic response/property of insulating dilute oxide Zn1-xMnxO films.

Keywords: Diluted magnetic Semiconductors, *Mn* doped ZnO, Band-gap modification, Ferromagnetism, Photoluminescence and defects, Spin-electronics,

Solution to optimal power flow Problem: A comprehensive survey

Naveen Kumar, Ramesh Kumar, Ram Kumar

Department of Electrical Engineering
National Institute of Technology, Patna-800005, INDIA
Katihar Engineering College, Katihar-854109, INDIA

ABSTRACT

Operation of power system with systematic planning plays an important role in growth of economy of country. The optimal power flow has an utmost duty is reliable, safe and finest functioning of the power system. OPF consists of complicated, non-convex, non-linear, non-constant as well as multi-channel problem which contains both discrete and constant variables. So different objective function such as minimization of fuel cost, minimization of emission, improving voltage profile, enhancement of voltage stability, reducing active power loss and minimization of transmission cost have to achieve. Techniques which are used to solve OPF problems are arithmetic programming method, analytical approach and meta-heuristic optimization algorithm. This work focuses a review of different methods used for OPF in power system.

Keywords: Optimal power flow, Objective functions, Constraints, Approaches for OPF, Merits and demerits of different approaches for OPF solution.

Machine Learning based Ventricular Tachycardia Detection of ECG Signal

[1]Pampa Howladar, [2]Manodipan Sahoo

[1]Indian Institute of Engineering Science and Technology, Shibpur, India,

2IIT (ISM), Dhanbad, Jharkhand, India

ABSTRACT

In primary diagnosis and analysis of heart defects, an ECG signal plays a significant role. This paper presents a model for the prediction of ventricular tachycardia arrhythmia using noise filtering, unique set of ECG features and machine learning based classifier model. Before signal feature extraction, we detrend and denoise the signal in order to eliminate the noise for detecting features properly. After that necessary features have been extracted and necessary parameters related to these feature are measured. Using these parameters, we prepared a classifier model using machine learning which is able to detect ventricular tachycardia arrythmia efficiently. Our results indicate that Logistic regression and Decision tree based models are most efficient machine learning models for detecting ventricular tachycardia arrhythmia. In order to diagnose heart diseases and find care for a patient, early, reliable diagnosis of different types of arrhythmia is necessary. By implementing our proposed method, this work deals with the problem of reducing the misclassification of the critical signal related to ventricular tachycardia very efficiently. Experimental findings demonstrate satisfactory enhancements and demonstrate high resilience to the algorithm that we have proposed. With this assistance, doctors can assess this type of arrhythmia of a patient early and take the right decision in proper time.

Keywords— Electrocardiography (ECG), ECG signals, filtering, data classification, feature extraction, ventricular tachycardia arrhythmia

Extract of Green Chili: A new source of electricity

[1]K.A.Khan, [2]Shahinul Islam, [3]Md. Sayed Hossain, [4]Salman Rahman Rasel

[1]Department of Physics, Jagannath University, Dhaka-1100, Bangladesh.

[2]Department of Physics, Uttara University, Dhaka, Bangladesh.
[3]Center for Research Reactor, Bangladesh Atomic Energy Commission, Bangladesh
Local Government Engineering Department (LGED), Sherpur Sadar, Sherpur, Bangladesh

ABSTRACT

Green chili is abundantly available for everywhere in the world. It is cultivating for cooking in curry. It can be used a green source of energy. Previously it has been generated electricity from different vegetative and fruits. Electrochemistry is the responsible of mechanism for electricity generation from vegetative and fruits. In this paper, it has been used as a source of electricity using electrochemical cell. The Zn/Cu based electrodes were used and the extract of the green chili was used as an electrolyte. The green-electrochemical systems achieve the reduction reaction with a certain voltage for which electrons transfer between the cathode and anode. Here, cathode means gain of electron and anode means loss of electrons. In this research paper, Zinc is used as an anode and Copper is used as an cathode. The electrons react with Cu^{2+} and H^{+}. The Cu^{2+} and H^{+} eventually convert into Cu and H_2 atoms. Finally, it is shown that Cu atoms were deposited onto the copper plate and H_2 releases from the green chili electrochemical cell. The experimental results were observed with and without adding copper sulfate solution $CuSO_4 \cdot 5H_2O$ as a secondary salt. The outcome of the research work improvises a better understanding on the electricity generation technology of the system.

Keywords: Green chili, Extract, Electrochemical cell, Electricity Generation, Performance, Zn/Cu electrodes.

Man Machine Interface in Designing through Simulation in Solar Power Development in India

Er. Shreya Karmakar, Dr. Pradip Kumar Sadhu

Department: Electrical Engineering
Indian Institute of Technology, Dhanbad – 826004, INDIA

ABSTRACT

The history of evolution of mankind is the evolution of man-machine interface. In recent past, in Indian Banking sector, users have availed multiple benefits through banking at user's convenience. This has happened through core banking system, internet banking, app based payment system etc. Such man-machine interfaces, through mobile phone and internet connectivity, have replaced the traditional physical movement and cash intensive transactions.

For mitigating the climate change, the Govt. of India has taken large scale Renewable Energy [RE] programme which has resulted rapid capacity addition in RE in India, especially in Solar PV & Wind Energy. Thus, from an intermediate power supply system to the main driving force of Indian Power Sector, Solar Energy development in India has received a quantum jump during 2009 to 2020. The then manual exercises for site survey to design-engineering has transformed into simulation based man-machine interfaces. In the present article, a sincere attempt is made to study, analysis and recommend on the evolution, adaptation and future scope of further propagation of man machine interface for designing through simulation.

Keywords: Man Machine Interface, Sketchup, PVSYST, Prototyping, Modeling, Simulation.

BIO DATA OF
Dr. Marko Spasenovic

Name designation:
Dr. Marko Spasenovic, ICTM Department of Microelectronic Technologie,University of Belgrade, Institute of Chemistry, Technology and Metallurgy, National Institute of the Republic of Serbia, Europe.

Short biodata

Dr. Marko Spasenovic is an Associate Research Professor with the Institute for Chemistry, Technology and Metallurgy, University of Belgrade. His main current lines of research are sensors based on 2D nanomaterials and graphene microphones. He completed his undergraduate education in Engineering Physics at Carleton University in Canada, followed by a MSc in Physics at the University of Toronto, where he researched ultrafast photocurrent generation in semiconductors (supervised by prof. Henry van Driel). He completed his PhD at AMOLF in Amsterdam and the University of Twente, the Netherlands, with a thesis on near-field mapping of optical fields in photonic and plasmonic nanostructures (supervised by prof. Kobus Kuipers). Subsequently, he held two postdoc positions at ICFO near Barcelona, Spain, where he worked on plasmons in graphene (prof. Frank Koppens) and laser trapping and cooling of levitated dielectric nanoparticles in vacuum (prof. Romain Quidant). He published a number of highly cited papers in renowned international journals (including three papers in Nature journals) and gave a number of keynote and invited talks at international conferences.

Curriculum Vitae – Main points - 2020

Basic Data:

Hab. Dr Eng. Jerzy Szymański
ORCID: 0000-0002-9493-8424
WoS Researcher ID AAD-7530-2020

Professor in Radom University – Poland - UE
E-mail: j.szymanski@uthrad.pl

Education: • University of Technology and Humanities in Radom (UTH Radom) / Faculty of Transport, Electrical Engineering and Computer Sciences / Scientific Postdoctoral Graduation (habilitation) • Warsaw University of Technology / Electrical Faculty / Department of Industry Power Electronics / Doctor of Philosophy (PhD) in Electrical Engineering • Warsaw University of Technology / faculty of Electronics / Master of Science (MSc) in Electronic Engineering

Research Areas:

• Power Electronics Converters in Drive Applications • Application of Power Converters in Renewable Sources and Battery Electric Vehicles • EMC Compatibility in Power Converters Systems • Hybrid power systems in electric industry drives • Energy Storages for BEV and Active Power Filters

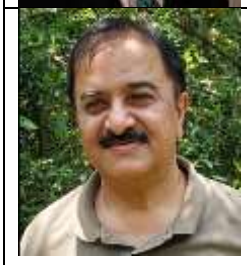
Work Experience:

• Currently – after study up till now scientific worker and academic lecturer at Technology and Humanities University in Radom/Poland, now on professor position in faculty of Transportation, Electrical and Computer Sciences in Electric Drives and Power Electronics Devices Division. • Currently, about 70 scientific publications, 2 patents obtained, supervisor of 5 doctoral students in the discipline of Automatic Control, Electronics and Electrical Engineering. • Council of the UTH Doctoral School in Radom, - coordinator of the discipline of automation, electronics and electrical engineering • 2000-2010 – board member of ELPOL Ltd. – responsibilities: identifying and establishing new business, organising sales visits, preparing tenders & proposals and quotations, negotiating contracts & terms and conditions, reviewing cost and sales performance, providing product education and advice, attending trade. Medium and low voltage power distribution and electrical drives systems, power quality devices, active filters, ups and others power electronic devices. Involved in industry electrical projects: renewable sources in smart grid distribution systems, electric drives of long belt conveyors with regulated belt speed in surface lignite mines, drive motion systems of surface mining machines like: excavators and spreaders.

Computer skills: • Microsoft Office / MS Project / Autocad / Eplan / Matlab-Simulink / ANSYS - Simplorer / LaTex (TexStudio, JabRef)

Foreign languages: • English, Russian – good, german – basic.

Micro2021, May 8th - 9th, 2021, Online(hosted from Kolkata, India).
List of invited Speakers/ Session Chairs/Experts

	**Prof. Zeev Zalevsky** Keynote Speaker Professor and The Dean of the faculty of engineering in Bar-Ilan University, Israel. (His major fields of research are optical super resolution, biomedical optics, nano-photonics and fiber-based processing and sensing architectures. His Google Scholar Citation is: 14685 (accessed on 29/04/2021)).
	**Invited Speaker:** **Dr. Marko Spasenovic** ICTM Department of Microelectronic Technologies, University of Belgrade, Institute of Chemistry, Technology and Metallurgy, National Institute of the Republic of Serbia, Europe.
	**Prof.(Dr.) Abhijit Biswas** General Chair, Micro2019 and Professor, Dept. of Radio Physics and Electronics University of Calcutta, Kolkata, India E-mail: abiswas5@rediffmail.com www.caluniv.ac.in
	**Dr Jerzy R. Szymanski,** University Professor, Faculty of Transport, Electrical Engineering and Informatics Kazimierz Pulaski University of Technology and Humanities, Radom – 26-000, POLAND
	**Prof. Surendra Kumar Dogra** Department of Computer Science & Engineering Trident Academy of Technology Bhubaneswar-751016, Odisha, India. Dy. General Manager(retired), Automation and Instrumentation Department, Smelter Plant Unit, National Aluminium Company (NALCO), Angul, Odisha.
	**Dr. Raghvendra Sahai Saxena** Scientist, grade F, Defence Research and Development Oorganization, Delhi, India. Since 1998, he has been a Scientist with the Solid State Physics Laboratory (SSPL), DRDO, Delhi. His B.E. degree in ECE from G. B. Pant Engineering College, Pauri Garhwal, India in 1997, M.Tech. in Microelectronics from Indian Institute of Technology (IIT), Bombay, India in 2003 and Ph.D. degree from Indian Institute of Technology (IIT), Delhi, India in 2012.
	**Dr. Koushik Guha** Department of Electronics and Communication Engineering, National Institute of Technology, Silchar, Assam, India.

	**Prof. Md. Kamrul Alam Khan** Professor, Department of Physics, & Ex-Chairman (Department of Physics), & Ex - Dean (Faculty of Science) Jagannath University, Dhaka-1100, Bangladesh.
	Dr. Harsupreet Kaur Department of ECE, University of Delhi, Delhi, India. And Secretary of IEEE(EDS), Delhi Chapter.
	**Dr. Reshmi Maity** Department of Electronics and Communication Engineering Mizoram University(a Central University) Mizoram, India.
	**Dr. Aminul Islam** M.Tech, Ph.D in Electronics Engineering. Asst.Professor, Birla Institute of Technology, Mesra Rachi, Jharkhand, India. Email: aminulislam@bitmesra.ac.in (He has served for Indian Air Force for 21 ½ years. Until November 2006, he was with Indian Air Force. Since November 2006, He is a member of Institution of Engineers (MIE), India and senior member of IEEE, USA.)
	**Dr. Moumita Mukherjee**, M.Tech, Ph.D Associate Dean, Adamas University Barasat, Kolkata, West Bengal, India. Ex. Sr. Scientist of DRDO Centre of Excellence (under Ministry of Defence, Govt. of India). Email: mm.adamasuniv@gmail.com
	**Prof. Dulal Acharjee** Chairman, Micro2021 and Director, Applied Computer Technology, Kolkata Website: http://actsoft.org, Email: dulal@actsoft.org, dulalacharjee@gmail.com and President, International Association of Science, Technology and Management Mobile: 8240120380, 8420582707
	**Dr. Rishu Chaujar** Associate Professor Department of Applied Physics Delhi Technological University, Delhi

Advertisement:

CCSN2021

10th International Conference on

Computing, Communication and Sensor Networks

Website: actsoft.org/ccsn2021
Paper submission site: https://cmt3.research.microsoft.com/ccsn2021

02nd and 3rd October, 2021

Organizer: Applied Computer Technologies, Kolkata, India.

Contacts:

1. Prof. Singam Jayanthu, General Chair, CCSN2021, and Professor of NIT, Rourkela, Odisha.
2. Prof. D Acharjee, Chairman, CCSN2021, Email: info@actsoft.org, ccsn2012@gmail.com
3. **Prof. Szymanski Jerzy,** Electrical Engineering and Informatics, Kazimierz Pulaski University of Technology and Humanities, Radom – 26-000, POLAND

Advertisement:

ESDA-2021

4th International Conference on

Energy Systems, Drives and Automations

Venue: Kolkata, West Bengal, India,

Website: www.actsoft/esda2021

Conference date: 25th **and 26th of December, 2021**

Contacts:

1. Prof. Pradip Sadhu, General Chair, ESDA2021 and Professor, dept. of EE, ISM, Dhanbad, Jharkhand ,West Bengal, India.
2. Prof. D Acharjee, Chairman, ESDA2020, and Director, Applied Computer Technology, Kolkata, India. Email: esda.conference@gmail.com, info@actsoft.org
3. Dr. Marta Zurek-Mortka, Specialist, Department of Control Systems, Lukasiewicz Research Network - Institute for Sustainable Technologies, Radom, Poland, Europe.

Proceeding Book:
Micro2021

Board of Editors: