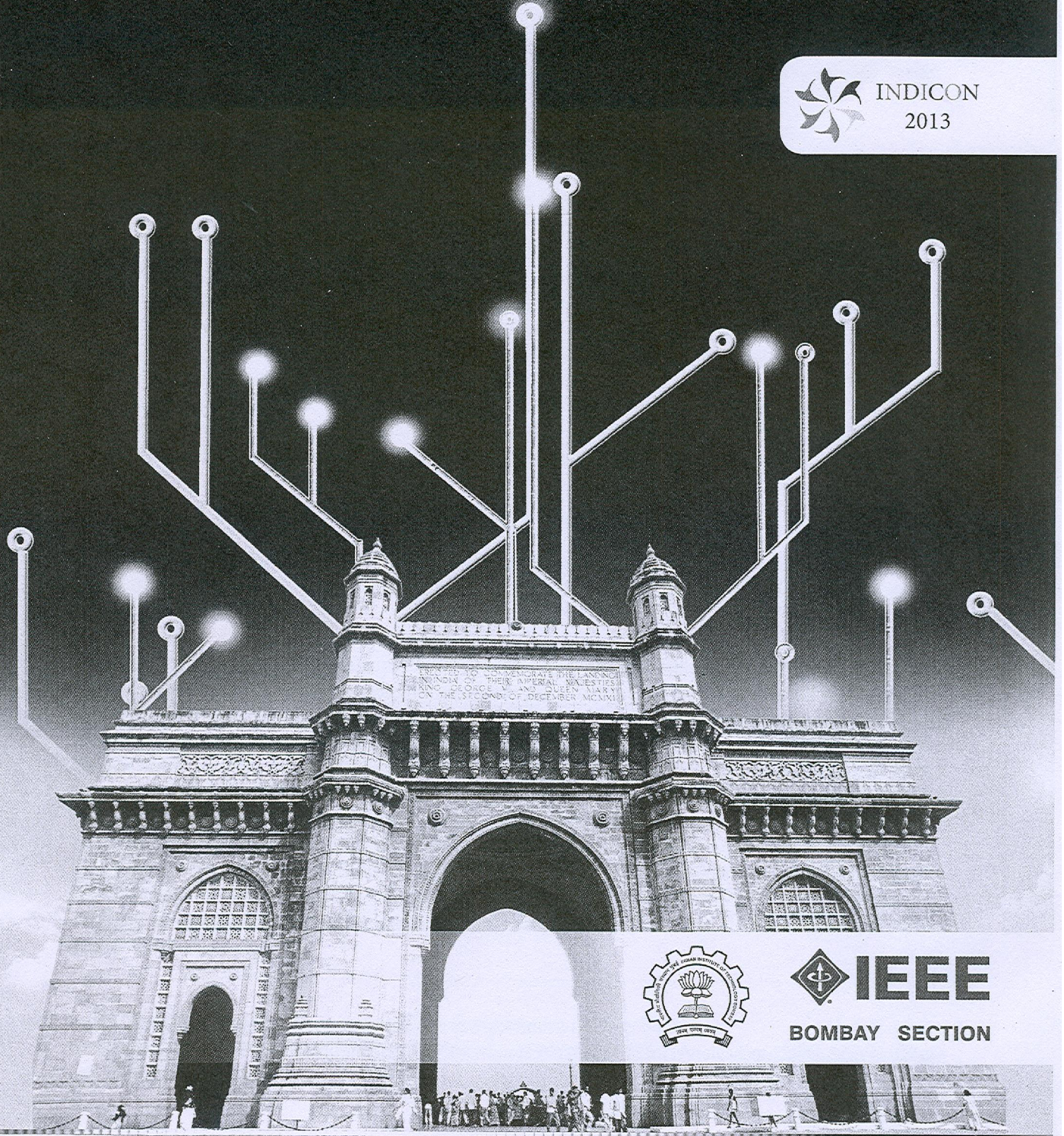INDICON
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time with bounded values. Also it is found that number of iterations in Revised Simplex is less and hence the time taken is less than the other two methods.

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1115   Hind Alwan and Anjali Agarwal. Concordia University
Energy and Congestion-Aware QoS Routing for Wireless Sensor Networks

Abstract: WSNs hold the promise of many new applications that require the network to handle traffic with different priority levels and QoS requirement in an energy efficient way while avoiding collisions and interference. In this paper, we investigate several aspects related to the application requirements and the network states and resources in order to provide multi-QoS routing protocol for WSNs. We propose an Energy and Congestion-Aware QoS Routing protocol (ECA-QoS) for wireless sensor network. A QoS-aware priority scheduling considering MAC layer is used and a path selection mechanism is proposed to achieve the required QoS in terms of end-to-end data transmission reliability and delay towards alleviating congestion and extending the network lifetime. The proposed mechanism is evaluated through extensive simulations and the results have demonstrated the effectiveness of our proposed mechanism for different metrics.

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1116   Vishesh Dokania and Dr. Aminul Islam. Birla Institute of Technology (Deemed University)
Design of Variation-Resilient CNFET-Based Schmitt Trigger Circuits with Optimum Hysteresis at 16-nm Technology Node

Abstract: Process, voltage and temperature (PVT) variations in emerging ultra-deep submicron (UDSM) technology nodes critically affect device performances and limit further scaling of such devices based on Moore's law. This paper proposes CNFET-based design of robust Schmitt trigger circuits, which outperform their CMOS counterparts in terms of mean values as well as variabilities of all considered design metrics. Popular Schmitt trigger designs are investigated and a comparative analysis is carried out based on Monte Carlo simulations in an HSPICE environment, using the 16-nm CMOS Predictive Technology Model (PTM), to choose the designs with best performance in terms of variability of design metrics such as power, power-delay product (PDP) and hysteresis width. These are then re-designed with a corresponding optimized CNFET model. The proposed CNFET-based circuits provide a $9.9\times$, $11.8\times$ and $22\times$ improvement in power, PDP and hysteresis width variability respectively, while also providing better noise immunity through increased hysteresis widths, thus demonstrating their superiority to CMOS circuits in all respects at highly scaled technology nodes.

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1117   Durga Madhab Mahapatra, Chanakya H N and Ramachandra T V. IISc, Bangalore
Bioenergy generation from components of a Continuous Algal Bioreactor: Analysis of Lipids, Spectroscopic and Thermal properties

Abstract: Influx of sewage into surface water results in nutrient enrichment and consequently leads to algal bloom and voluminous organic sludge production in urban areas as in case of Bangalore. The lack of utilities of algae and resulting sludge has lead to anoxia and GHG emissions. Environmental friendly ways of sludge and algal biomass utilities as well as disposal are scant. Testing for biofuel and combustion properties can be beneficial to meet the energy requirement to run treatment plants and might have better fuel value to increase the net energy gain in the system. As the volume of algal biomass and quantity of sludge has increased over the past few years, sustainable means of biomass and sludge utilization needs to be devised for beneficial purposes, to keep the surface waters clean and regulate the biomass productivity of such systems. Therefore the biomass and sludge characterization becomes imperative for any further utilities. In the present study the indigenous suspended algae and the algal reactor sludge were characterized for the different functionalities and presence of bio-chemicals (carbohydrates, proteins and lipids) through Infrared Analysis (ATR-FTIR). The total lipids and fatty acid methyl esters (FAME) composition were studied. The heat values and thermal decomposition pattern were analyzed by (Thermogravimetry (TGA) / Differential Thermal Analysis (DT) and Differential Scanning Calorimetry (DSC)). The algae were found to have a better total lipid content of >34 % compared to 22% in case of wastewater sludge with quality FAME for better biofuel properties. However there were higher number of FAME in wastewater sludge (>30) where C16 and C18 members dominated. Algal biomass showed higher calorific value of 17.96 MJkg-1 compared to 10.33 MJkg-1 of wastewater sludge.

1118   Phanikumar Chamarthi and Vivek Agarwal. IIT Bombay
Novel Selfbalancing Single phase asymmetric 9 level Grid connected inverter for Photovoltaic Applications

Abstract: Two power conversion stages are generally used when low voltage unregulated PV voltage is conditioned to generate AC power. This paper proposes a novel 9 level inverter topology to generate high voltage AC by using low voltage PV modules. To realize high voltage AC at the output, the proposed circuit configuration can accommodate dual PV inputs. Further, this inverter is capable of boosting the input voltage by 1.5 times. Proposed system can feed high quality power into the grid from both the PV modules operating at their respective MPPs. The multi-level inverter uses a total of 10 power switches among which two work at twice the output frequency (i.e. 2×50Hz) with required voltage withstanding capability equal to the total DC voltage applied to the input. 4 switches operate at high frequency with required voltage withstanding capability equal to half the total input DC voltage. Remaining 4 of the switches and 8 of the power diodes with required voltage withstanding capability of one fourth of the total input DC voltage. Due to more number of levels in the synthesized output voltage, the output filter requirements are significantly reduced. All the results of this work are presented.

1125   Ravindrakumar Nagarale* and Balasaheb Patre**.
*MBES, College of Engineering Ambajogai, **SGGSIE&T, Nanded
Exponential function based Decoupled Fuzzy Sliding Mode Control of Nonlinear Systems