

Sl. No.	<p style="text-align: center;"><b>IIT Ropar</b>  <b>List of Recent Publications with Abstract</b>  <b>Coverage: April, 2020</b></p>
1.	<p><a href="#">A Half-Cycle Fast Discrete Orthonormal S Transform based Protection-class <math>\mu</math>PMU</a>  Y Bansal, R Sodhi - IEEE Transactions on Instrumentation and Measurement, 2020</p> <p><b>Abstract:</b> This paper proposes a novel Fast Discrete Orthonormal Stockwell Transform (FDOST) based Protection-class Micro Phasor measurement unit (P-<math>\mu</math>PMU) algorithm. The proposed algorithm provides very fast and high-resolution measurements of the system state, which are then expected to serve various Active Distribution Networks (ADNs) protection applications, e.g., islanding detection, fault detection, etc. The phasors are estimated from FDOST, utilizing the Half Cycle Discrete Fourier Transform. The two major concerns of the Half Cycle FDOST with respect to the response in the presence of even-harmonics and off-nominal frequency are handled using the Even Harmonics Filtration (EHF) and Half Cycle Sample Value Adjustment (HC-SVA), respectively. Since both of these techniques, viz., EHF and HC-SVA require system frequency as the input, a new Peak and Zero Crossing based Hybrid Frequency Estimator (PZC-HFE) is also proposed in this work. The performance of the proposed methodology is evaluated for various simulated scenarios as per the IEEE Std. C37.118.1a-2014, as well as in the hardware setup. The results of the proposed P-<math>\mu</math>PMU algorithm are also compared with two other methodologies, i.e., Hilbert transform-convolution based PMU (HTC-PMU) and 2-cycle Interpolated Discrete Fourier Transform based PMU (IpDFT-PMU) using the hardware setup. The test results reveal the superiority of the proposed P-<math>\mu</math>PMU algorithm over the compared methods in terms of response time and the estimation accuracy.</p>
2.	<p><a href="#">A Novel Saliency-Based Cascaded Approach for Moving Object Segmentation</a>  PW Patil, A Dudhane, S Murala, AB Gonde - International Conference on Computer Vision and Image Processing, 2020</p> <p><b>Abstract:</b> The existing approaches achieved remarkable performance in many computer vision applications like moving object segmentation (MOS), classification, etc. However, in presence of infrequent motion of foreground objects, bad weather and dynamic background, the accurate foreground-background segmentation is a tedious task. In addition, the computational complexity is a major concern, as the data to be processed is large in case of video analysis. Considering the above mentioned problems, a novel compact motion saliency based cascaded encoder-decoder network is proposed for MOS. To estimate the motion saliency of current frame, background image is estimated using few neighbourhood frames and subtracted from the current frame. Further, to estimate prior foreground probability maps compact encoder-decoder network is proposed. The estimated foreground probability maps are undergoes the problem of spatial coherence where visibility of foreground objects is not clear. To enhance the spatial coherence of obtained foreground probability map, cascaded encoder-decoder network is incorporated. The intensive experimentation is carried out to investigate the efficiency of proposed network with different challenging videos from CDnet-2014 and PTIS database. The segmentation accuracy is verified and compared with existing method in terms of average F-measure. In addition, the compactness of proposed method is analysed in terms of computational complexity and compared with the existing methods. The performance of proposed method is significantly improved as compared to existing methods in terms of accuracy and computational complexity for MOS task.</p>
3.	<p><a href="#">A Tale of Three - Tensionless strings and vacuum structure</a>  A Bagchi, A Banerjee, S Chakraborty, S Dutta... - Journal of High Energy Physics, 2020</p>

	<p><b>Abstract:</b> Within the premise of canonical quantisation, we re-examine the quantum structure of bosonic tensionless string theory. In the classical theory, the worldsheet metric degenerates and the Bondi-Metzner-Sachs (BMS) algebra arises as the residual symmetries on fixing the tensionless equivalent of the conformal gauge. In the quantum regime, we find, on careful examination, that there are multiple ways to impose constraints to restrict the physical Hilbert space, which in turn lead to three distinct choices of tensionless vacua. We analyse these vacua in detail, commenting on various aspects like the central charges and the spectrum around each of them.</p>
4.	<p><a href="#">Accessing Dihydro-1,2-oxazine via Cloke-Wilson type Annulation of Cyclopropyl Carbonyls: Application towards the Diastereoselective Synthesis of Pyrrolo[1,2-b][1,2]oxazine</a> P Kumar, R Kumar, P Banerjee - <i>The Journal of Organic Chemistry</i>, 2020</p> <p><b>Abstract:</b> A convenient additive-free synthesis of dihydro-4H-1,2-oxazines via a Cloke-Wilson type ring expansion of the aryl substituted cyclopropane carbaldehydes (ACC) with the hydroxylamine salt is introduced. Comparatively less active cyclopropyl ketones also follow a similar protocol if supplemented by catalytic pTSA.H<sub>2</sub>O. The transformation is performed in an open-to-air flask as it shows negligible sensitivity towards air/moisture. Dihydro-4H-1,2-oxazines when subjected to cycloaddition with the cyclopropane diester, affords a trouble-free formulation of the valued hexahydro-2H-pyrrolo[1,2-b][1,2]oxazine derivatives. Cascade one-pot variant of this two-step strategy offers a comparable overall yield of the final product.</p>
5.	<p><a href="#">Adaptive analogue calibration technique to compensate electrode motion artefacts in biopotential recording</a> A Karmakar, DM Das, MS Baghini - <i>IET Circuits, Devices &amp; Systems</i>, 2020</p> <p><b>Abstract:</b> This study presents an adaptive analogue calibration method to compensate electrode–skin impedance mismatch during biopotential signal (electrocardiogram, electroencephalogram and electromyogram) acquisition with enhanced immunity to electromagnetic interference (EMI). The method continuously measures the variation of the impedance mismatch between the electrode–skin interfaces arising primarily due to motion artefacts, and thereafter compensate for the resulting distortions at the output. The compensation is done with the help a proportional–integral–derivative controller in the feedback loop, together with the acquisition of the biopotential signals. A common mode shunt feedback at the output attenuates the common mode EMI and reduces the common mode deviation. As compared to previously reported techniques, the proposed technique refutes any need for offline manual calibration and shows a significant improvement in EMI attenuation without interrupting the main system's operation. This study explains the proposed technique with the comprising blocks, illustrates the theoretical models and analyses, and evaluates the superior performances of the proposed method by comparing the responses with those obtained from the other EMI-Immune electrode mismatch compensating front-ends existing in the literature.</p>
6.	<p><a href="#">An Automatic State Detection Algorithm for Non-intrusive Load Monitoring</a> S Dash, K Gandhi, R Sodhi - <i>IEEE 16th India Council International Conference</i>, 2019</p> <p><b>Abstract:</b> Knowing the power consumption of individual household appliances is useful for end-user as well as utilities. There are two ways for appliance load monitoring (ALM), namely intrusive load monitoring (ILM) and non-intrusive load monitoring (NILM). This paper focuses on the NILM approach, and discusses a simple yet effective method to improve its accuracy by constructing a better knowledge-base. The proposed methodology is initially verified with the</p>

	<p>simulation using the Reference Energy Disaggregation Data (REDD) dataset, and later tested on a lab-scale hardware setup as well. Test results reveal that careful construction of knowledge-base can increase the performance of NILM algorithms. MATLAB is used as the programming platform.</p>
7.	<p><a href="#">Analysis of interactions in totally asymmetric exclusion process with site-dependent hopping rates: Theory and simulations</a>  A Jindal, T Midha, AK Gupta - <i>Journal of Physics A: Mathematical and Theoretical</i>, 2020</p> <p><b>Abstract:</b> Biological molecular motors are special enzymes that support biological processes such as intracellular transport, vesicle locomotion, RNA translation and many more. Experimental works suggest that the motor proteins interact among each other and moreover they experience a push by other motors during the intracellular transport. To incorporate these dynamics, we consider a variant of open one-dimensional totally asymmetric simple exclusion process with site-dependent hopping rates and interactions. The qualitative properties of our system do not depend on the hopping rate function. We utilize the simple mean-field (SMF), the cluster mean-field (CMF), the correlated cluster mean-field (CCMF) to theoretically calculate the stationary phase diagrams, density and the maximal particle current. The limitations of all the three theories are extensively discussed. It has been found that although the interactions do not change the number of phases in a phase diagram, it significantly changes the density profiles, the phase transition lines and the maximal particle current. The theoretical results obtained are supported by Monte Carlo simulations.</p>
8.	<p><a href="#">Asymmetric Organocatalytic Double 1, 6-Addition: Rapid Access to Chiral Chromans with Molecular Complexity</a>  I Chatterjee, S Roy, S Pradhan, K Kumar - <i>Organic Chemistry Frontiers</i>, 2020</p> <p><b>Abstract:</b> An organocatalytic cascade vinylogous double 1,6-addition strategy for the synthesis of chiral chroman derivatives is reported. The cascade reaction follows oxa-Michael/1,6-addition reactions between ortho-hydroxyphenyl-substituted para-quinone methadienes and 2,4-dienal derivatives to deliver chroman derivatives with excellent yields (up to 96%) and stereoselectivities (up to &gt;20:1 d.r., &gt;99% ee). The chiral secondary amine-based Jørgensen-Hayashi organocatalysts are shown to catalyze the transformation of unbiased 2,4-dienals under mild reaction conditions with exclusive <math>\delta</math>-site selectivity and high control over enantioselectivity at a remote position. The synthetic transformations of the products ensure molecular complexity with a great level of enantio control.</p>
9.	<p><a href="#">Bactericidal characteristics of bioinspired nontoxic and chemically-stable disordered silicon nanopyramids</a>  SK Saini, M Halder, Y Singh, R Nair - <i>ACS Biomaterials Science &amp; Engineering</i>, 2020</p> <p><b>Abstract:</b> Controlling bacterial growth using artificial nanostructures inspired from natural species is of immense importance in biomedical applications. In the present work, a low cost, fast processing, and scalable anisotropic wet etching technique is developed to fabricate the densely packed disordered silicon nanopyramids (SiNPs) with nanosized sharp tips. The bactericidal characteristics of SiNPs are assessed against strains implicated in nosocomial and biomaterial-related infections. Compared to the bare silicon with no antibacterial activities, SiNPs of <math>1.85 \pm 0.28 \mu\text{m}</math> height show 55 and 75% inhibition of <i>Escherichia coli</i> (Gram-negative) and <i>Bacillus subtilis</i> (Gram-positive) bacteria, whereas the silicon nanowires (SiNWs) fabricated using a metal-assisted chemical etching method show 50 and 58% inhibition of <i>E. coli</i> and <i>B. subtilis</i>. The mechanistic studies using a scanning electron microscope and live/dead bacterial cell assay reveal cell rupture and predominance of dead cells on contact with SiNPs and SiNWs,</p>

	<p>which confirms their bactericidal effects. Chemical stability and cell viability studies demonstrate the biocompatible nature of SiNP and SiNW surfaces. Owing to their capability to kill both Gram-negative and positive bacteria and minimal toxicity to murine fibroblast cells, SiNPs can be used as an antibacterial coating on medical devices to prevent nosocomial and biomaterial-related infections.</p>
10.	<p><a href="#">Construction of 3D lanthanide based MOFs with pores decorated with basic imidazole groups for selective capture and chemical fixation of CO<sub>2</sub></a>  SS Dhankhar, CM Nagaraja – <i>New Journal of Chemistry</i>, 2020</p> <p><b>Abstract:</b> Three new 3D lanthanide-based metal-organic frameworks (MOFs), [Ln<sub>2</sub>(ImBDC)<sub>3</sub>(2H<sub>2</sub>O)]<sub>n</sub> (where, Ln = Tb<sup>+3</sup> (1)/ Sm<sup>+3</sup> (2) / Eu<sup>+3</sup> (3), ImBDC = 2-(imidazol-1-yl)terephthalic acid) have been synthesized solvothermally and characterized with single-crystal X-ray diffraction and other physicochemical methods. MOF1-3 are isostructural and feature a 3D framework structure with 1D channels of dimension 3.91 X 5.27 Å<sup>2</sup> decorated with basic imidazole groups. Owing to imidazole functionalized pores, MOF1 exhibits selective adsorption property for CO<sub>2</sub> with high interaction energy (Q<sub>st</sub>) of 37.1 kJ/mol. The activated sample of the MOFs act as efficient heterogeneous catalysts for the cycloaddition reaction of CO<sub>2</sub> to epoxides to generate value-added cyclic carbonates. Interestingly, due to the narrow pore channels of the MOFs, preferential conversion of smaller size epoxides over the larger epoxides is observed. Furthermore, the MOF catalyst could be recycled and reused up to five cycles without significant reduction in the catalytic activity. Thus the present study demonstrates size-selective catalytic activity for the conversion of smaller epoxides to cyclic carbonates under mild reaction conditions.</p>
11.	<p><a href="#">Coupled eigenfunction expansion–boundary element method for wave scattering by thick vertical barrier over an arbitrary seabed</a>  A Choudhary, S Koley, SC Martha - <i>Geophysical &amp; Astrophysical Fluid Dynamics</i>, 2020</p> <p><b>Abstract:</b> Wave structure interaction problem having thick vertical barrier over an arbitrary seabed is analysed for its solution. The associated boundary value problem is handled using a coupled eigenfunction expansion–boundary element method. This method converts the boundary value problem into integral equation over the physical boundaries. The physical boundaries are discretised into a finite number of elements and hence the integral equation give rise to a system of linear algebraic equations. Finally, the system of equations is solved to obtain the physical quantities, namely, the reflection and transmission coefficients. For ensuring the correctness of these physical quantities, the energy balance relation is derived and verified. The present results are also verified by comparing the results available in the literature. The present study reveals that the width and height of the structure along with the undulated seabed play an important role to construct an effective wave barrier to protect various marine facilities from wave attack and also helpful to create the tranquility zone on the lee side of the structure.</p>
12.	<p><a href="#">Design, Synthesis and Antimicrobial Evaluation of 1, 3, 4-Oxadiazole/1, 2, 4-Triazole-Substituted Thiophenes</a>  N Singla, G Singh, R Bhatia, A Kumar, R Kaur, S Kaur - <i>ChemistrySelect</i>, 2020</p> <p><b>Abstract:</b> The increasing level of antimicrobial resistance in pathogenic bacteria, together with the lack of new potential drug scaffolds in the pipeline, make the problem of infectious diseases a major public health concern. Thus, in this context, a novel series of 1,3,4-oxadiazole-substituted thiophenes (4 a–m) and 1,2,4-triazole (6 a–m) substituted thiophene derivatives were synthesized. Characterization of all the synthesized derivatives was done by various spectroscopic</p>

	<p>techniques such as <math>^1\text{H}</math> NMR, <math>^{13}\text{C}</math> NMR spectroscopy and mass spectrometry, and evaluated for antimicrobial activity against various pathological strains using broth dilution and disc diffusion method. In particular, compound 6 e and 4 e exhibited significant inhibitory potential with MIC ranging from 2–7 <math>\mu\text{g mL}^{-1}</math> against <i>S. aureus</i>, <i>B. subtilis</i>, <i>P. aeruginosa</i> and <i>E. coli</i>. Additionally, compound 6 e was found to be highly potent against methicillin resistant <i>S. aureus</i> (MRSA; MIC=2 <math>\mu\text{g mL}^{-1}</math>). Molecular docking studies were also performed to confer the possible mode of action and association studies indicate the binding of potent active compound with DHFR enzyme (<math>K_a=2.10\times 10^3 \text{ M}^{-1}</math>). Further, the mechanism of action has also been explored by atomic force microscopy (AFM), which reveals the bacterial cell wall deformity and cell wall rupturing that may lead to bacteria cell death. Additionally, <i>in silico</i> ADME prediction study suggested the drug like properties of active compounds.</p>
13.	<p><a href="#">Dirac fermion, cosmological event horizons, and quantum entanglement</a> S Bhattacharya, S Chakraborty, S Goyal - Physical Review D, 2020</p> <p><b>Abstract:</b> We discuss the field quantization of a free massive Dirac fermion in the two causally disconnected static patches of the de Sitter spacetime, by using mode functions that are normalizable on the cosmological event horizon. Using this, we compute the entanglement entropy of the vacuum state corresponding to these two regions, for a given fermionic mode. Further extensions of this result to more general static spherically symmetric and stationary axisymmetric spacetimes are discussed. For the stationary axisymmetric Kerr-de Sitter spacetime in particular, the variations of the entanglement entropy with respect to various eigenvalues and spacetime parameters are depicted numerically. We also comment on such variations when instead we consider the nonextremal black hole event horizon of the same spacetime.</p>
14.	<p><a href="#">Effect of carbon nanotube doping on the energy dissipation and rate dependent deformation behavior of polyurethane foams</a> J Bhinder, PK Agnihotri - Journal of Cellular Plastics, 2020</p> <p><b>Abstract:</b> An experimental investigation is performed to characterize the effect of carbon nanotubes on the average mechanical properties of polyurethane foams. Polyurethane foams are doped with as-grown and oxidized carbon nanotubes at varying carbon nanotube concentrations. It is observed that the inclusion of carbon nanotubes up to a threshold concentration decreases the density of freely expanding polyurethane foams. Uniaxial and cyclic compression testing of foam samples is carried out to study their energy dissipation and rate dependent deformation behavior. While energy dissipation is observed to be higher in neat polyurethane foams, carbon nanotube reinforced foams show better recovery when compressed beyond elastic limit due to their stiffer foam cell walls. It is shown that incorporation of oxidized carbon nanotubes should be preferred over as grown carbon nanotubes to improve flexural, thermal and acoustic response of polyurethane foams. Scanning electron microscopy analysis of compressed samples reveals that cell shearing; cell bending and fracture at nodes are the predominant mode of deformation in all foam samples.</p>
15.	<p><a href="#">End-of-Primary Consolidation Parameters Using Inflection Point Method</a> R Moozhikkal, RG Retnamony - Géotechnique, 2020</p> <p><b>Abstract:</b> This Note describes a faster and complete consolidation testing procedure using the inflection point method so as to obtain the void ratio-consolidation curve at the end-of-primary consolidation and the coefficient of consolidation. The testing procedure is similar to the conventional incremental load consolidation test with the only difference that the subsequent loading is applied once the degree of consolidation of <math>U = 70.15\%</math> is reached. The time and</p>

	<p>settlement corresponding to <math>U = 70.15\%</math> is obtained using the inflection point method, from which the end-of-primary consolidation and the coefficient of consolidation are evaluated. The validity of the proposed procedure is verified by performing tests on four reconstituted and three undisturbed soil samples. By adopting the proposed procedure, complete consolidation tests can be completed within 2.5 to 9 hours depending on the coefficient of consolidation of the soils.</p>
16.	<p><a href="#">FACT-from actual to conceptual tie-ins: a multi-level knowledge graph structured on context and semantics of software artefacts</a>  S Sharma, B Sodhi - Proceedings of the 35th Annual ACM Symposium on Applied Computing, 2020</p> <p><b>Abstract:</b> Knowledge Graphs have increasingly become the preferred approach to complex problems that involve low-level business data. It is well known that Google, LinkedIn, Facebook, Twitter - all have a knowledge graph at their core.</p> <p>In this paper, we propose: i) A knowledge graph, called FACT, which is designed for applications in software engineering problems. ii) A novel system which can automatically populate FACT. Example applications of FACT include verifying design decisions, recommending software elements to reify design decisions, and so on. Vertices of FACT represent items such as a software design concept, a concrete software element which reifies a concept. An edge represents the relationship that may exist between the vertices.</p> <p>The design of FACT as well as the system used to populate it has been validated a) at micro-level by verifying or proving the correctness of the individual components of FACT, and b) at macro-level by experimentally ascertaining the correctness of scenario-based inferences derived from the knowledge contained in FACT.</p>
17.	<p><a href="#">FACT: FORTRAN toolbox for calculating fluctuations in atomic condensates</a>  A Roy, S Pal, S Gautam, D Angom... - Computer Physics Communications, 2020</p> <p><b>Abstract:</b> We develop a FORTRAN code to compute fluctuations in atomic condensates (FACT) by solving the Bogoliubov–de Gennes (BdG) equations for two component Bose–Einstein condensate (TBEC) in quasi-two dimensions. The BdG equations are recast as matrix equations and solved self consistently. The code is suitable for handling quantum fluctuations as well as thermal fluctuations at temperatures below the critical point of Bose–Einstein condensation. The code is versatile, and the ground state density profile and low energy excitation modes obtained from the code can be easily adapted to compute different properties of TBECs — ground state energy, overlap integral, quasi particle amplitudes of BdG spectrum, dispersion relation and structure factor and other related experimental observables.</p>
18.	<p><a href="#">First Principles Design and Investigation of Siligraphene as a Potential Anode Material for Na-Ion Battery</a>  N Yadav, B Chakraborty, TJ Dhilip Kumar - The Journal of Physical Chemistry C, 2020</p> <p><b>Abstract:</b> The continuous depletion of lithium resources has derived a great attention towards the development of non-lithium rechargeable batteries having electrode material that prove to be promising in delivering advantages of cost effectiveness, high charge/discharge rate and excellent storage capacity. Due to its planar honeycomb structure, a 2-D monolayer of siligraphene <math>\text{SiC}_7</math> has being explored as an electrode material for Na-ion battery on the basis of its geometric, structural and electrochemical properties by employing van der Waals corrected first principles calculations based on density functional theory. The dynamic and thermal stability is well validated by phonon dispersion spectra and ab initio molecular dynamics. Direct band gap of 0.7 eV presents it as a semiconductor material effective to be used as an electrode. Potential</p>

	<p>adsorption sites on the surface of SiC<sub>7</sub> are studied for effective storage capacity. Bader charge analysis revealed the charge transfer between monolayer upon adsorption of Na ions. A high Na storage capacity of 696 mAh/g is obtained along with a low diffusion barrier of 0.8 eV which further facilitates easy diffusivity of Na ions through the monolayer. Additionally, a working voltage of 0.84 V reveals that SiC<sub>7</sub> will be a potential candidate for anode in Na ion batteries.</p>
19.	<p><a href="#">Governance, urbanization, and pollution: A cross-country analysis of global south region</a>  DP Dash, SR Behera, DT Rao, <a href="#">N Sethi</a>... - Cogent Economics &amp; Finance, 2020</p> <p><b>Abstract:</b> This paper investigates the impact urbanization, industrialization, corruption, human development, energy consumption, and foreign direct investment (FDI) on carbon dioxide (CO<sub>2</sub>) emissions of 61 developing economies of the global south region of Asia, Africa, and Latin America during the period 1990–2015. The empirical results show that the effect of corruption on CO<sub>2</sub> emissions is indeed heterogeneous and contradictory. Specifically, results exhibit that due to immature economic system, and policy paralysis, corruption penetrates the developing economies, and eventually cause carbon emission and pollution. Furthermore, results reveal that FDI guided by clean development mechanism and involved in emission reduction projects in the developing economies play a predominant role to curb the CO<sub>2</sub> emission, pollution, and environmental degradation.</p>
20.	<p><a href="#">Heating of liquid foods in cans: Effects of can geometry, orientation, and food rheology</a>  R Borah, S Gupta, L Mishra, RP Chhabra - Journal of Food Process Engineering</p> <p><b>Abstract:</b> In this work, the effect of geometry and orientation of food cans on the heating characteristics of processed liquid foods and the resulting lethality target values as a function of the processing times have been investigated. For this purpose, the governing differential equations have been solved numerically for elliptical and cylindrical cans of varying aspect ratios in different orientations in order to delineate their effect on the heating rate (especially of the slowest heating zone [<i>SHZ</i>]) and lethality values over wide ranges of rheological features including shear thinning (<math>n &lt; 1</math>), Newtonian (<math>n = 1</math>), and shear thickening (<math>n &gt; 1</math>) behaviors. The flow and heat transfer characteristics were analyzed with the help of velocity vectors, isotherm contours, average Nusselt number, <i>SHZ</i> temperature and heat penetration parameters, and lethality target values. Also, comparisons were made in terms of the sterilization time and heat penetration parameters to identify the preferable geometries and orientations of food cans for effective heating of non-Newtonian foodstuffs. Finally, favorable conditions in terms of the shape and orientation of the can and the rheological properties have been delineated which lead to superior heating characteristics.</p>
21.	<p><a href="#">High Torque/Ampere Direct Torque Control of Switched Reluctance Motor Drives</a>  V Shah, M Alam, S Payami - National Power Electronics Conference, 2019</p> <p><b>Abstract:</b> Direct flux and torque (DFTC) scheme is introduced for switched reluctance motors (SRMs) to minimize the inherent output torque ripples. In DTFC voltage vectors are chosen in such a way that the stator flux is kept constant, making it very sensitive to working condition. However, in SRM phases are independently excited, resulting in a nonlinear flux trajectory. In this paper, a new direct torque control (DTC) scheme is proposed, where sector boundaries are redesigned, and alternative optimized voltage vectors are selected. The proposed control technique also makes stator flux less sensitive to the working condition. This allows the phase to de-energize faster than the conventional DFTC, along with achieving high torque/ampere ratio with reduced ripples in torque. To show the effectiveness of the proposed DTC scheme over the</p>

	conventional DTFC scheme simulation studies for the same operating conditions is carried out using Matlab/Simulink environment.
22.	<p><a href="#">Interphase engineering in carbon fiber/epoxy composites: Rate sensitivity of interfacial shear strength and interfacial fracture toughness</a>  HS Bedi, BK Billing, PK Agnihotri - Polymer Composites, 2020</p> <p><b>Abstract:</b> Designing the interface in polymer composites is fundamentally a challenging task. Here, we demonstrate a strategy to engineer the interphase microstructure in carbon fiber/epoxy composites (CFRPs) using carbon nanotubes (CNTs). The incorporation of CNT modifies the interfacial mechanics and interfacial chemistry in conventional CFRPs by creating concentrated, dispersed and mixed type interphase. Therefore, a detailed study is warranted to establish the interfacial microstructure-property relationship in CNT modified CFRPs. Experimental results show that the relative improvement in interfacial shear strength (IFSS) and interfacial fracture toughness (<math>G_{ic}</math>) depends on the microstructure of interphase. It is shown that simultaneous improvement in IFSS and <math>G_{ic}</math> is possible with certain types of microstructural designs. Moreover, it is observed that IFSS and <math>G_{ic}</math> are not constant material parameters but both of them show a power-law type dependence on the applied loading rate. The range of rate sensitivity parameters as a function of interphase type suggests that while concentrated and mixed interphase is more suited to maintain the interfacial integrity, dispersed interphase is beneficial for energy dissipating applications of CFRPs. In addition, IFSS and <math>G_{ic}</math> exhibit negative rate sensitivity for certain cases. Finally, it is shown that interphase designing using CNT is an excellent tool to accurately tailor the average interfacial properties of CFRP in a broad range of 16-79 MPa and 100-453 J m<sup>-2</sup> for IFSS and <math>G_{ic}</math>, respectively.</p>
23.	<p><a href="#">Intralayer Synchronization in Evolving Multiplex Hypernetworks: Analytical Approach</a>  S Rakshit, BK Bera, EM Bollt, D Ghosh - SIAM Journal on Applied Dynamical Systems, 2020</p> <p><b>Abstract:</b> In this paper, we study intralayer synchronization of multiplex networks where nodes in each layer interact through diverse types of coupling functions associated with different time-varying network topologies, referred to as <i>multiplex hypernetworks</i>. Here, the intralayer connections are evolving with respect to time, and the interlayer connections are stagnant. In this context, an interesting and important problem is to analyze the stability of the intralayer synchronization in such temporal networks. We prove that if the dynamical multiplex hypernetwork for the time-average topology possesses intralayer synchronization, then each layer of the time-varying multiplex hypernetwork will also be synchronized for sufficiently fast switching. Then through master stability function formalism, we analytically derive necessary and sufficient stability conditions of intralayer synchronous states for such temporal architecture in terms of a time-average network. In this regard, we are able to decouple the transverse error component of the intralayer synchronization states for some special cases. Also, we extend our study for nonlinear intralayer coupling functions as well as multilayer hypernetwork architectures. Finally, the theoretical findings are verified numerically by taking the network of paradigmatic chaotic Rössler oscillators.</p>
24.	<p><a href="#">IoT-Driven Real-Time Monitoring of Air Pollution with Dynamic Google Mapping</a>  Nikhil, M Kaur - Proceedings of International Conference on IoT Inclusive Life, Part of the Lecture Notes in Networks and Systems book series, 2020</p> <p><b>Abstract:</b> For the estimation of air quality index of an area, monitoring the air quality only at some locations is not enough. Hence the monitoring of air quality at multiple locations is required to get the fair idea about pollution at different areas. This paper basically represents the</p>



	<p>monitoring of air pollution caused by the integrity of residential and industrial areas located at different places. An IoT-enabled gas-sensing module is used, which can either be connected on a vehicle or can be placed at an open area for getting real time and continuous values of air pollutants present in the air. The use of open source database management enables the system to collect and send the data of gas-sensing module on web server. Also the use of dynamic Google mapping technique helps to locate the areas with poor air quality. These areas can be identified by the pollution control boards and immediate steps can be taken to reduce the emission of polluted gases.</p>
25.	<p><a href="#"><u>Low-Light Visible and Infrared Image Fusion in NSST Domain</u></a>  AM Sharma, A Dogra, B Goyal, R Vig, S Agrawal - Proceedings of International Conference on IoT Inclusive Life, Part of the Lecture Notes in Networks and Systems book series, 2020</p> <p>Abstract: Multisensor images are captured to facilitate the human visual system under different environmental circumstances. Nowadays, images are captured in a wide range of electromagnetic spectrum. The focus of this manuscript will be on images captured from two sensors, viz. Visible and Infrared. The images captured from these sensors are integrated efficiently to enhance the information content of fused images and the performance is evaluated with the help of various metrics available. In this manuscript, fusion methods based on four benchmark techniques are presented on a challenging dataset and evaluated on the basis of various evaluation metrics and also visually and according to the results obtained this can be established successfully that the Shearlet-based methods are most efficient in terms of subjective as well as objective quality.</p>
26.	<p><a href="#"><u>Mediating Effect of Attributional Biases in the Impulsivity–Aggression Relationship Among Adolescents: Therapeutic Implications</u></a>  P Singh - International Journal of Offender Therapy and Comparative Criminology, 2020</p> <p><b>Abstract:</b> Aggression is a multidimensional phenomenon, and for its better understanding, specificity involved in its dynamics must be explored. This article explores the role of attributional bias as a mediator between impulsivity and aggressive tendencies among adolescents. The mediating effect of hostile attributional bias (HAB) on the impulsivity–aggression relationship has not been studied extensively so far, especially in the Indian context. For testing the hypotheses, 320 participants within the age range 12 to 15 years (<i>M</i> age = 13.57 years) were selected and administered relevant standardized questionnaires. Baron and Kenny’s criterion was used for mediation analysis, demonstrating that HAB partially mediates the association between impulsivity and aggression. Findings imply that reducing HAB through some reattribution intervention may be an effective strategy to reduce impulsivity-induced aggression. Specific guidelines to implement such interventions are suggested in the discussion.</p>
27.	<p><a href="#"><u>Quality &amp; Reliability Assessment of USB-PLL Clock Failure in Silicon Products</u></a>  MK Pandey, AK Sinha, PK Sharma, R Sharma - IEEE 21st Electronics Packaging Technology Conference, 2019</p> <p><b>Abstract:</b> Quality and reliability are one of the crucial test features in post silicon validation which ensures the performance of flawless silicon production. This paper addresses the issue related to random clock valid failure of USB-PLL during the series of reliability testing on 28nm SoC product. However, in existence of such an unpredictable issue, silicon production cannot happen; though during the design verification and functional validation, the USB PLL clock valid was working as per design. To avoid production discontinuation, a permanent solution is need of the hour. So, this issue has been replicated on analog bench validation for further debugging and root-causing. During the debugging, PHY's clock validity issue was isolated and PLL clock was</p>

	<p>not obtained at digital logic of the USB. Thus, we propose the immediate solution for this product-level reliability problem by adding a reset sequence through a software setting. In addition to above, designers have been requested for thorough review of robustness of the oscillator concept to optimize this issue from designer perspective.</p>
28.	<p><a href="#">Reliability Improvement in Clustering Based Vehicular Ad-hoc Network</a> R Singh, D Saluja, S Kumar - IEEE Communications Letters, 2020</p> <p><b>Abstract:</b> Clustering based vehicular Ad-hoc Network (CAN) is being considered as the most viable solution to integrate millimeter wave (mmWave) and sub-6 GHz interface in vehicular communication. In CAN, the data path contains two cascaded links, mostly mmWave link for vehicular to vehicular (V2V) connectivity and sub-6 GHz link for vehicular to infrastructure (V2I) connectivity. In this letter, we have introduced diverted path approach (DPA) to enhance V2V communication reliability. In addition, the notion of back-up link has been introduced to enhance V2I communication reliability. Then, through simulation results, it is shown that DPA can significantly improve V2V communication reliability. Further, it is shown that the incorporation of both the proposed schemes with the existing CAN, significantly enhances the overall vehicular (V2V+V2I) communication reliability.</p>
29.	<p><a href="#">Reversible hydrogen adsorption in Li functionalized [1, 1] paracyclophane</a> R Y Sathe, T J D Kumar - International Journal of Hydrogen Energy, 2020</p> <p><b>Abstract:</b> Hydrogen is a good alternative to replace fossil fuels in automobiles. Storage of hydrogen for vehicular applications with high gravimetric density is a challenging task. The hydrogen sorption capacity of [1,1]paracyclophane functionalized with Li is investigated using density functional theory. Li functionalized [1,1]paracyclophane physisorbs 8 H<sub>2</sub> achieving the maximum hydrogen weight percentage up to 13.42 %. All positive vibrational frequencies and a significant difference in the energy of frontier molecular orbitals confirm the stability and high absolute hardness of the host. Molecular dynamics simulations prove the thermal stability and reversibility of hydrogen adsorption over Li functionalized [1,1]paracyclophane implying the ease of on-board reversible hydrogen storage. Our findings confirm that Li decorated [1,1]paracyclophane is a good hydrogen storage material meeting the 2020 targets of DOE.</p>
30.	<p><a href="#">Ruthenium (II)-arene complexes containing ferrocenamide ligands: Synthesis, characterisation and antiproliferative activity against cancer cell lines</a> P Mandal, C Sonkar, S S Dhankhar, C M Nagaraja... - Journal of Organometallic Chemistry, 2020</p> <p><b>Abstract:</b> This work deals with synthesis of new ferrocenamide ligands <i>i.e.</i> pyridine-2-carboxylic acid(4-ferrocenyl aniline)-amide, HL<sup>1</sup> and quinoline-1-carboxylic acid(4-ferrocenyl aniline)-amide, HL<sup>2</sup> and two new heterobimetallic Ru(II)-arene complexes of general formula [Ru(L)(η<sup>6</sup>-arene)Cl] using synthesized ferrocenamide ligands (L<sup>1</sup> = pyridine-2-carboxylic acid(4-ferrocenyl aniline)-amide, η<sup>6</sup>-arene = <i>p</i>-cymene 1, and L<sup>2</sup> = quinoline-1-carboxylic acid(4-ferrocenyl aniline)-amide, η<sup>6</sup>-arene = <i>p</i>-cymene 3). These chloro-complexes have been substituted with 1,3,5-triaza-7-phosphadamantane (PTA) which produce water soluble complexes of general formula [Ru(L)(η<sup>6</sup>-arene)(PTA)]<sup>+</sup> [2, 4]. All the complexes have been characterized thoroughly with different analytical tools and their antiproliferative activities have been evaluated against different cancerous cell lines. Among them, compound 3 has shown promising antiproliferative activity against all the cell lines, owing to its lower stability than the other complexes in solution as well as ability to interact with different biomolecules, which makes it a potential candidate as anticancer drug to investigate further.</p>
31.	<p><a href="#">S2DNet: Depth Estimation from Single Image and Sparse Samples</a></p>

	<p><a href="#">P Hambarde, S Murala - IEEE Transactions on Computational Imaging, 2020</a></p> <p><b>Abstract:</b> Depth prediction from single image is a challenging task due to the intra scale ambiguity and unavailability of prior information. The prediction of an unambiguous depth from single RGB image is very important aspect for computer vision applications. In this paper, an end-to-end sparse-to-dense network (S2DNet) is proposed for single image depth estimation (SIDE). The proposed network processes single image along with the additional sparse depth samples for depth estimation. The additional sparse depth sample are acquired either with a low resolution depth sensor or calculated by visual simultaneous localization and mapping (SLAM) algorithms. In first stage, the proposed S2DNet estimates coarse-level depth map using sparse-to-dense coarse network (S2DCNet). In second stage, the estimated coarse-level depth map is concatenated with the input image and used as an input to the sparse-to-dense fine network (S2DFNet) for fine-level depth map estimation. The proposed S2DFNet comprises of attention map architecture which helps to estimate the prominent depth information. The quantitative and qualitative performance evaluation of the proposed network has been carried out using the error metrics. We perform complete evaluation of S2DNet on four publically available benchmark data sets i.e. NYU Depth-V2 indoor dataset [1], KITTI odometry outdoor dataset [2], KITTI depth completion test database [12] and SUN-RGB database [13]. Further, we have extended the proposed S2DNet for image de-hazing. The experimental analysis shows that the proposed S2DNet outperforms the existing state-of- the-art methods for both single image depth estimation and image de-hazing.</p>
32.	<p><a href="#">Synthesis and characterization of zinc oxide reinforced aluminum metal matrix composite produced by microwave sintering</a></p> <p><a href="#">N Kumar Bhoi, H Singh, S Pratap - Journal of Composite Materials, 2020</a></p> <p><b>Abstract:</b> The study focuses on the microstructural, phase transformation, and physical and mechanical aspects of aluminum/zinc oxide composite produced by a hybrid microwave sintering technique. In the present case, zinc oxide nanorods were synthesized through a cost-effective thermal decomposition method. The obtained zinc oxide nanorods' length was in the range of 76–168 nm observed through high-resolution transmission electron microscopy images and crystallinity nature was confirmed by the bright spot in the selected area electron diffraction pattern. Two different wt% (i.e. 0.5 and 2) of zinc oxide nanorods were utilized for the fabrication of the composite material. The diffraction pattern of the milled powder and energy dispersive spectroscopy results shows effective diffusion of zinc oxide nanorods in the aluminum. The elemental mapping of milled powder illustrates the uniform distribution of the reinforcement over matrix material. The micro-hardness results exhibit a higher hardness of 27.78% with a small fraction of 2 wt%. The nano-indentation results confirm the improvement in the nano-hardness by 32.21% with 2 wt% of zinc oxide with a marginal decrease in elastic modulus by 4.92%.</p>
33.	<p><a href="#">Tempered fractional Poisson processes and fractional equations with Z-transform</a></p> <p><a href="#">N Gupta, A Kumar, N Leonenko - Stochastic Analysis and Applications, 2020</a></p> <p><b>Abstract:</b> In this article, we derive the state probabilities of different type of space- and time-fractional Poisson processes using <math>z</math>-transform. We work on tempered versions of time-fractional Poisson process and space-fractional Poisson processes. We also introduce Gegenbauer type fractional differential equations and their solutions using <math>z</math>-transform. Our results generalize and complement the results available on fractional Poisson processes in several directions.</p>
34.	<p><a href="#">The normal complement problem and the structure of the unitary subgroup</a></p>

	<p><a href="#">S Kaur, M Khan - Communications in Algebra, 2020</a></p> <p><b>Abstract:</b> Let <math>p</math> be an odd prime and <math>G</math> be a finite split metabelian <math>p</math>-group of exponent <math>p</math>. In this article, we obtain a normal complement of <math>G</math> in <math>(\text{Formula presented.})</math> where <math>F</math> is the field with <math>p</math> elements. Further, assume that <math>(\text{Formula presented.})</math> where <math>A</math> is a finite abelian <math>p</math>-group and <math>(\text{Formula presented.})</math> If <math>F</math> is any finite field of characteristic <math>p</math>, then we prove that <math>G</math> does not have a normal complement in <math>(\text{Formula presented.})</math> and obtain the structure of the unitary subgroup <math>(\text{Formula presented.})</math></p>
35.	<p><a href="#">The role of dynamic defects in transport of interacting molecular motors</a>  <a href="#">A Jindal, AB Kolomeisky, AK Gupta - Journal of Statistical Mechanics: Theory and Experiment, 2020</a></p> <p><b>Abstract:</b> Motor proteins or biological molecular motors are special enzyme molecules that drive biological transport in living cells by moving cellular cargoes along linear protein filaments. The experimental evidences suggest that while performing their mechanical work biological molecular motors interact with each other, and there are other biological molecules on their tracks that influence their progression. Stimulated by these observations, we propose a one-dimensional totally asymmetric simple exclusion process with nearest-neighbor interactions and a dynamic defect that is allowed to reversibly bind and unbind at a specific site far away from the boundaries. A theoretical framework based on cluster mean-field approximation is adopted to determine the stationary properties of the system. The role of interactions and the effect the reversible defect associations on the dynamics of the system is discussed. It is found that three or less stationary phases can exist in the system, depending on the interaction strength, and only one of them is strongly affected by the defect association/dissociation dynamics. The theoretical results are validated through extensive Monte Carlo simulations.</p>
36.	<p><a href="#">Triple Band Polarisation Sensitive Metamaterial Absorber for Terahertz Applications</a>  <a href="#">P Jain, AK Singh, S Bansal, K Prakash, L Hadda...N Sardana - 7<sup>th</sup> International Conference on Signal Processing and Integrated Networks (SPIN), 2020</a></p> <p><b>Abstract:</b> In this work, we propose a novel-shaped metamaterial absorber (MMA) for terahertz (THz) applications. The proposed MMA comprises of metallic layers separated by gallium arsenide (GaAs) substrate demonstrating three absorption peaks at 1.71, 3.16 and 4.89 THz with absorptivity of 99.4, 99.6 and 90.5%, respectively. The normalized impedance, constitutive electromagnetic (EM) parameters, surface current and electric field distributions are analyzed for better understanding of absorption mechanism. The absorption with different incident and polarization angles is also analyzed. The proposed absorber is ultra-compact (0.0583) and ultra-thin (0.0283) at the lowest frequency of operation, hence, can be utilized for potential applications including sensing and imaging.</p>
37.	<p><a href="#">Two-Dimensional MoS<sub>2</sub>-based Electrochemical Biosensor for Highly Selective Detection of Glutathione</a>  <a href="#">B Rawat, KK Mishra, U Barman, L Arora, D Pal... - IEEE Sensors Journal, 2020</a></p> <p><b>Abstract:</b> Glutathione (GSH) recently emerges as an important biomarker for cancers and various disease detection as its concentration varies in the <math>\mu\text{M}</math> to <math>\text{mM}</math> range in biological cells and fluids. Despite extensive efforts devoted to optical detection and quantification of GSH, there still exists an intensive demand for the development of an electrochemical sensor to allow rapid measurements even in lower concentration limit with excellent repeatability and accuracy. Two-dimensional MoS<sub>2</sub> can be a promising candidate to enhance biosensor performance as it</p>

<p>offers a larger surface-to-volume ratio, suitable bandgap, label-free sensing capability, and compatibility with commercial planar fabrication technologies for large scale production. Therefore, this work develops an electrochemical sensor based on MoS<sub>2</sub> for the detection and quantification of GSH concentration to investigate the perspective of biopsy-free cancer detection. The Glutathione-S-Transferase (GST) was immobilized on the MoS<sub>2</sub> surface, and the electrochemical activity of GSH and 1-chloro-2,4-dinitrobenzene (CDNB) in the presence of GST was utilized for detection. MoS<sub>2</sub>-based sensor was showed a high selectivity of 535 × larger current compared to a blank test. The electrochemical sensor has exhibited the sensitivity of 704 pA/μM and the limit of detection of 703 nM with a wider linear detection range of 10 μM - 500 mM. Furthermore, the MoS<sub>2</sub>-based sensor exhibited the excellent repeatability and stability that makes its novel sensing device for cancer detection and quantification.</p>
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