SCHOLARLY PUBLICATIONS
School of Electronics Engineering
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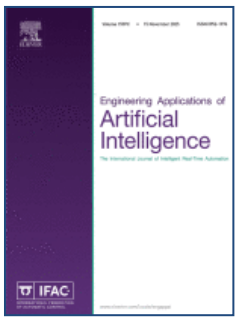
Journal Name: Engineering Applications of Artificial Intelligence **IF: 8.0**

Title: Malicious detection and trust calculation using residual recurrent neural network for trust with quality of service-aware multicast routing in mobile ad-hoc network system

Author: S.K., Sarangi, Sanjaya Kumar; R., Lenka, Rasmita; J., Mishra, Janmejaya; R., Sahu, R.; A., Nanda, Arabinda

Details: Vol. 161, December 2025

Abstract: A Mobile Ad-hoc Network is a collection of mobile nodes without any proper infrastructure. In this work, a novel trust and Quality of Service-aware multicast routing technique for Mobile Ad-hoc Network is introduced. The key scope of this research paper is to evaluate the trust with Quality of Service -aware multicast routing process in Mobile Ad-hoc Network by detecting malicious nodes. For performing the optimal routing without any suspicious attacks initially the malicious node detection is performed by Residual Recurrent Neural Network. Further, if the Mobile Ad-hoc Network model is normal and free from malicious nodes, then the true value is calculated by utilizing the outcome of malicious node detection. If the node is free from malicious then, the trust value becomes high or else the trust value becomes low. Once, the trust calculation is completed the optimal routing is performed in the Mobile Ad-hoc Network with the support of the Enhanced Artificial Rabbits Optimization algorithm. Moreover, different constraints like hop count, throughput, Packet Delivery Ratio, delay, and energy consumption are derived. Further, different experiments are evaluated to prove the effectiveness of the implemented model against several baseline techniques. Hence, the developed model accomplishes superior efficiency in detecting the malicious and performs the multicast routing in the Mobile Ad-hoc Network.



URL: https://www.sciencedirect.com/science/article/pii/S0952197625021384?via%3Dihub

SCHOLARLY PUBLICATIONS
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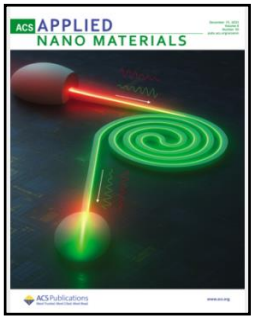
Journal Name: ACS Applied Nano Materials **IF: 5.5**

Title: Resistive Switching and Synapse Properties of Bilayered CuO|MAPbI3Nanometer-Thick Films

Author: Rana, M.; Malik, R.; M.; Saha, R.; P.; C.; Khanna, S.P.; Srivastava, R.; Suman, C.K.

Details: Volume 8, Issue 50, December 2025

Abstract: Brain-inspired computing can be effectively realized by using oxide-based memristors that replicate biological synaptic functions. CuO nanoparticles synthesized via the sol–gel route were employed for photosynaptic memristive devices aimed at neuromorphic applications. The CuO exhibited uniform grain morphology, confirmed by field emission scanning electron microscopy and showed a direct band gap of 2.18 eV by Tauc's plot. Electrical characterization revealed stable bipolar resistive switching with current levels ranging from 10^{-10} to 10^{-5} A and reliable retentivity up to 350 min. We report the enhanced device performance for a hybrid CuO/$MAPbI_3$ heterostructure by exploiting the complementary roles of oxygen vacancies in CuO and iodide ion migration in $MAPbI_3$. This synergistic mechanism lowered operating voltages, improved cycle stability, and enhanced uniformity compared to single-layer CuO devices. Moreover, the heterostructure device exhibited superior photosynaptic responses under combined optical and electrical stimuli, leading to improved plasticity and energy-efficient neural computation. Neural network simulations of single-layer CuO and CuO/$MAPbI_3$ heterostructure memristors achieve 91 and 97% recognition accuracies with 8 × 8-pixel images, respectively. These findings establish that the heterostructure of the hybrid CuO/$MAPbI_3$ memristors is a promising candidate for advanced neuromorphic hardware and next-generation brain-inspired computing technologies.



URL: https://pubs.acs.org/doi/10.1021/acsanm.5c04416

SCHOLARLY PUBLICATIONS
School of Electronics Engineering
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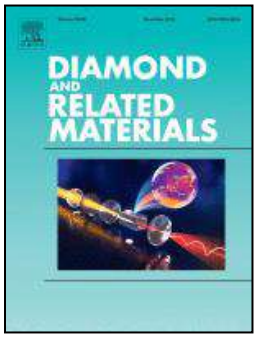
Journal Name: Diamond and Related Materials **IF: 5.1**

Title: Comprehensive sensing framework for sugar molecules based on graphene absorber: Coupled mode theory, transmission line analysis, and deep learning integration

Author: Khatami, S.A.; Rezaei, P.; Zamzam, P.; Hadipour, S.; Bhargav, B.

Details: Vol. 159, November 2025

Abstract: Metamaterial absorbers and their application in the terahertz spectrum, such as sensing, imaging, etc., are popular issues worldwide that draw the attention of engineers and researchers. This paper introduces a reconfigurable terahertz metamaterial absorber for detection applications. A few features of the design are its high sensitivity and polarization insensitivity in various refractive indexes of surrounding media, making it an excellent candidate for sensing applications. The design comprises three layers, Gold, SiO_2, and graphene, respectively, absorb the incident transmitted wave at 5.944 THz, with an excellent absorption of 99.98 % and a Q-factor of 17.69. This sensor was used to detect sugar molecules and find their application in industry and medicine. A deep learning framework is integrated with the absorber to further improve their detection. A large spectral dataset of 1260 samples, generated through simulations that account for variations in sample thickness, polarization, and incidence angles, is used to train a deep neural network. The model achieves a training accuracy of 98 %, a validation accuracy of 94.6 %, and a test accuracy of 95.24 % on 126 unknown samples, with only six misclassifications. These results demonstrate the effectiveness of combining terahertz metamaterial absorbers with deep learning techniques for accurate, robust identification of sugar molecules, making the system highly suitable for advanced biomedical sensing applications.



URL: https://www.sciencedirect.com/science/article/pii/S0925963525009914?via%3Dihub

SCHOLARLY PUBLICATIONS
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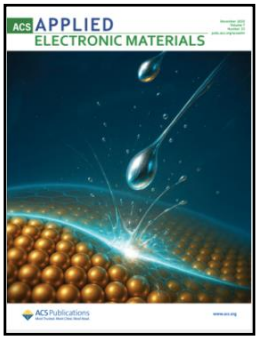
Journal Name: ACS Applied Electronic Materials **IF: 4.7**

Title: Development of 2D Structured CuS-Incorporated rGO Back Contact Layer for CdTe Solar Cells

Author: Pavithran, M.; Narayanan, V.; Aiswarya, C.P.; Vishnu, V.S.R.; Rajni, K.S.; Singh, U.P.

Details: Volume 7, Issue 23, December 2025

Abstract: The unique CuS-rGO composite back contacts were developed for CdS/CdTe heterojunction solar cells by combining sonochemical and spin-coating methods. The incorporation of CuS into the rGO matrix tunes the electrical properties of rGO and reduces the migration of Cu^{2+}into the CdTe absorber layer. In this study, the CuS, rGO, and CuS-rGO nanocomposite were synthesized by precipitation, the modified Hummer's method, and the sonochemical method, respectively. Three different composites were prepared by varying the CuS-to-rGO ratio. The structural, phase crystallization, optical, morphological, compositional, chemical, electrical, and electronic properties of bare CuS, rGO, and CuS-rGO composites were analyzed. The quantitative band alignment interpretation carried out using ultraviolet photoelectron spectroscopy (UPS) exhibited near-ohmic interface formation at the CuS-rGO composite/CdTe interface, with positive valence band (Δ_{EVB}) and conduction band (Δ_{ECB}) offset values of 0.40 and 0.33 eV, respectively, for the CR1 sample with a CuS-to-rGO ratio of 1:1. The back contacts were prepared by spin coating the CuS, rGO, and CuS-rGO nanocomposites on top of the FTO/CdS/CdTe structure, and the performance of the cells was tested and compared with a reference cell without the back contact layer (FTO/CdS/CdTe/Ag). Among the tested cells, the cell with composite CR1 as the back contact produced the best performance, with open circuit voltage (Voc), short circuit current density (Jsc), fill factor (FF), and power conversion efficiency (PCE) values of 0.760 V, 22.25 mA/cm, 57.35%, and 9.70%, respectively, with good reproducibility. To the best of our knowledge, this is the initial study on the CuS-rGO nanocomposite back contact layer for thin-film photovoltaics.



URL: https://pubs.acs.org/doi/10.1021/acsaelm.5c01603

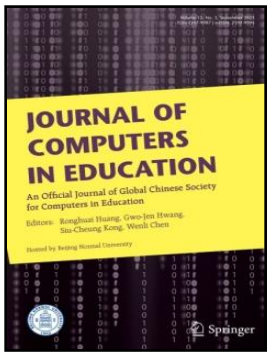
Journal Name: Journal of Computers in Education **IF: 4.7**

Title: Smart pedagogical learning and assessment methodologies—outcome based education: A novel quality assurance framework with attainment computation for Indian engineering higher education programs

Author: Mishra, A.; Singh, S.S.

Details: Volume 12, December 2025

Abstract: In engineering higher education, producing graduates with industry-ready techno-managerial skills in a very dynamic and rapidly changing industry/employer ecosystem is a huge challenge for higher education institutes (HEIs). Conventional teacher-centric classroom mode of teaching may not be apt rather a more effective student-centric skill-acquisition and outcome-based Teaching learning process (TLP) with modern pedagogical approach with a 360-degree quality life-cycle for continuous improvement would effective. In this paper, a Smart pedagogical learning and assessment methodology (SPLAM) is proposed by integrating Outcome based Education (OBE) framework and this fusion is coined by authors as SPLAM-OBE framework. SPLAM is proposed using five state-of-the-art strategies like active-learning, experiential-learning, technology-aided-learning, flipped-classroom based learning, problem-solving and critical-thinking based learning is need of the hour for engineering higher education programs offered by HEIs. This fusion design of SPLAM-OBE complies with the OBE framework requirements of National Board of Accreditation in India and some predominant international program accreditation agencies like Institute of Engineering & Technology U.K. and Accreditation Board for Engineering and Technology U.S.A. We have proposed SPLAM-OBE framework and implementation strategies with a case-study and validated the quality cycle and continuous improvement complying to program accreditation requirement by integrating smart pedagogical approach for effective TLP with a mission towards producing better skilled engineering graduates by better attainments of graduate attributes (GAs) and various outcome attributes like Course Outcomes (COs), Program Outcomes (POs), Program Specific Outcomes (PSOs), Program Educational Objectives (PEOs) and mission and vision statements of school/department and University/institute demonstrating 360 quality life-cycle.



URL: https://link.springer.com/article/10.1007/s40692-024-00344-9

SCHOLARLY PUBLICATIONS
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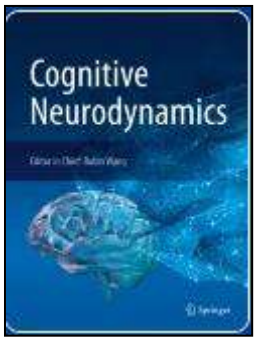
Journal Name: Cognitive Neurodynamics **IF: 3.9**

Title: Convolutional autoencoder-based deep learning for intracerebral hemorrhage classification using brain CT images

Author: Nageswara Rao B.; Acharya U.R.; Tan R.-S.; Dash P.; Mohapatra M.; Sabut S.

Details: Volume 19, Issue 1, December 2025, Article number 77

Abstract: Intracerebral haemorrhage (ICH) is a common form of stroke that affects millions of people worldwide. The incidence is associated with a high rate of mortality and morbidity. Accurate diagnosis using brain non-contrast computed tomography (NCCT) is crucial for decision-making on potentially life-saving surgery. Limited access to expert readers and inter-observer variability imposes barriers to timeous and accurate ICH diagnosis. We proposed a hybrid deep learning model for automated ICH diagnosis using NCCT images, which comprises a convolutional autoencoder (CAE) to extract features with reduced data dimensionality and a dense neural network (DNN) for classification. In order to ensure that the model generalizes to new data, we trained it using tenfold cross-validation and holdout methods. Principal component analysis (PCA) based dimensionality reduction and classification is systematically implemented for comparison. The study dataset comprises 1645 (“ICH” class) and 1648 (“Normal” class belongs to patients with non-hemorrhagic stroke) labelled images obtained from 108 patients, who had undergone CT examination on a 64-slice computed tomography scanner at Kalinga Institute of Medical Sciences between 2020 and 2023. Our developed CAE-DNN hybrid model attained 99.84% accuracy, 99.69% sensitivity, 100% specificity, 100% precision, and 99.84% F1-score, which outperformed the comparator PCA-DNN model as well as the published results in the literature. In addition, using saliency maps, our CAE-DNN model can highlight areas on the images that are closely correlated with regions of ICH, which have been manually contoured by expert readers. The CAE-DNN model demonstrates the proof-of-concept for accurate ICH detection and localization, which can potentially be implemented to prioritize the treatment using NCCT images in clinical settings.



URL: https://link.springer.com/article/10.1007/s11571-025-10259-5

SCHOLARLY PUBLICATIONS
School of Electronics Engineering
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Journal Name: Scientific Reports **IF: 3.8**

Title: Optimized placement of distributed generators, capacitors, and EV charging stations in reconfigured radial distribution networks using enhanced artificial hummingbird algorithm

Author: Sahay S.; Biswal S.R.; Shankar G.; Jha A.V.; Appasani B.; Srinivasulu A.; Nsengiyumva P.

Details: Volume 15, Issue 1, December, 2025

Abstract: This study presents an assessment of concurrently identifying the best location and size of distributed generators (DGs), shunt capacitors (SCs), and electric vehicle charging stations (EVCSs) in optimally reconfigured radial distribution networks (RDNs). A comprehensive literature review indicates that this multi-unit combination has the potential to enhance RDN performance significantly, but it remains an underexplored area of research. Therefore, further in-depth investigation is necessary to understand and fully maximize the benefits of this method. The optimal placement and sizing (OPS) of the mentioned multi-unit in RDNs is realized by employing a metaheuristic optimization technique subject to the fulfillment of a well-defined fuzzified-objective function comprising of line losses reduction, power factor improvement, voltage deviation reduction, and DG penetration limit. Employing the concept of centroid-based oppositional learning (COL), an improved version of the artificial hummingbird algorithm (AHA), named COLAHA, is proposed to decipher the adopted issue. The results achieved utilizing the offered approach are matched with those of the additional innovative algorithms such as the basic AHA, arithmetic optimization algorithm, genetic algorithm, and whale optimization algorithm. By evaluating it against several benchmark functions, the effectiveness of the proposed COLAHA is established. The performance of the aforementioned studied algorithms is further tested to find the OPS of DGs, SCs and EVCSs in the standard IEEE 69- and 118-bus RDNs. Results obtained conclude that the COLAHA has offered quick convergence and the best results over the others for all the studied combinations of the multi-unit model.

URL: https://www.nature.com/articles/s41598-025-89089-8

SCHOLARLY PUBLICATIONS
School of Electronics Engineering
KIIT Deemed to be University

Journal Name: Scientific Reports **IF: 3.8**

Title: Neural network backstepping control of OWC wave energy system

Author: Nath P.; Mishra S.K.; Jha A.V.; Appasani B.; Pati A.K.; Verma V.K.; Nsengiyumva P.; Srinivasulu A.

Details: Volume 15, Issue 1, December 2025

Abstract: This paper investigates the application of Neural Network Backstepping Control (NN-BSC) for enhancing the rotational speed control of Oscillating Water Column (OWC) wave energy systems. Traditional control methods face limitations when dealing with nonlinearities, irregular wave conditions, and actuator disturbances. To address these challenges, this research paper introduces a Chebyshev NN within the BSC framework, leveraging its high approximation accuracy and computational efficiency. The design of the NN-BSC involves estimating the disturbance term using the Chebyshev NN and validating the stability OWC control system through Lyapunov analysis. The proposed NN-BSC law effectively handles nonlinearities and improves system robustness under dynamic conditions. Numerical simulations have been conducted using MATLAB/SIMULINK to compare the performance of the uncontrolled OWC system, conventional PI and BSC, and NN-BSC, under scenarios with and without actuator disturbances. The parameters for PI, BSC, and NN-BSC are optimized using a Particle Swarm Optimization (PSO) algorithm, which minimizes a fitness function defined by the Integral Squared Error (ISE). Results indicate that NN-BSC achieves smoother rotor speed tracking, particularly under actuator disturbances, where the conventional PI and BSC exhibits significant performance degradation in terms of ISE. Under actuator disturbance scenarios: (1) NN-BSC achieved the lowest ISE value of 22.5433, outperforming PI (40.6381) and BSC (37.1192), and (2) NN-BSC demonstrated the lowest maximum peak overshoot (0.9651 rad/s) and fastest settling time (0.0561 s).

URL: https://www.nature.com/articles/s41598-025-87725-x

SCHOLARLY PUBLICATIONS
School of Electronics Engineering
KIIT Deemed to be University

Journal Name: AEU - International Journal of Electronics and Communications **IF: 3.2**

Title: Active metasurface based transmittive and reflective type reconfigurable multifunctional polarization converter

Author: N.K., Panda, Niten Kumar; S., Sahu, Sudhakar; S., Mohapatra, Sraddhanjali

Details: Volume202, December 2025

Abstract: A multifunctional P-I-N diode based frequency reconfigurable metasurface polarizer (RMSP) with transmittive and reflective modes is proposed. This RMSP is able to transform linear polarization (LP) electromagnetic (EM) waves to circular-polarization (CP) and cross-polarization (CLP) waves in C, X and Ku bands. Without a metal backing, the RMSP is considered as transmittive type having only reflection mode where a dual band LP-CLP conversion occurs within the frequency ranges 7.79 to 11.02 GHz and 8.12 to 11.21 GHz for off and on condition of P-I-N diode. This metal backed RMSP is converted to reflective type which has ability to convert LP-CP and LP-CLP. Less than 3 dB axial ratio (AR) is observed within 7.26 to 13.76 GHz. The polarization conversion and its handedness is explained using the magneto-electric (ME) dipole concept. The conversion process is verified by the surface current as well as the transfer matrix technique. A fabricated prototype of RMSP is tested for normal incidence which shows almost similar AR response for the transverse-magnetic (TM) and electric (TE) modes. This polarizer has potential applications in sensing polarization variation and reducing radar cross-section (RCS). Generation of simultaneous right and left CP waves by this polarizer is also useful for communication.

URL: https://www.sciencedirect.com/science/article/pii/S1434841125003620?via%3Dihub

SCHOLARLY PUBLICATIONS
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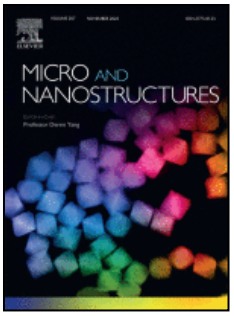
Journal Name: Micro and Nanostructures **IF: 3.0**

Title: Investigation of electrolyte gated negative capacitance vertical TFET pH sensor based on biomolecule position

Author: N., Yarlagadda, Nagalakshmi; G., Wadhwa, Girish; P., Kaur, Pawandeep; A., Thakur, Anchal; S.S., Singh, Sruti Suvadarsini; P., Mani, Prashant

Details: Vol. 207, November 2025

Abstract: n this study, a step gate Negative capacitance Vertical TFET (SG NC VTFET) has been proposed and investigated for its improved performance. The ferroelectric material has been added to the gate stack for the inclusion of negative capacitance. The position of biomolecules and their impact on the sensitivity of the SG NC VTFET have been examined. The position of biomolecules changes due to the diffusion process inside the cavity. The ferroelectric material HFO2 has been modelled to be considered in the simulation of the SG NC VTFET pH sensor. The impact of negative capacitance and the position of biomolecules improve the current (S_{ID}) and voltage sensitivity (S_V) of the SG NC VTFET pH sensor. The improved voltage sensitivity (S_V) is approximately equal to 753 mV/pH for = 8 nm, which is ten times more than the Nernstian limit (59.2 mV/pH), and S_{ID} has been enhanced by approximately half a decade per pH variation.



URL: https://www.sciencedirect.com/science/article/pii/S2773012325002158?via%3Dihub

SCHOLARLY PUBLICATIONS
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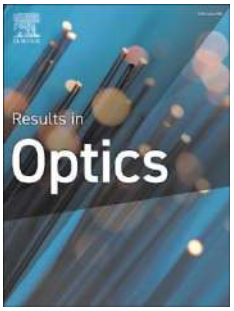
Journal Name: Results in Optics **IF: 3.0**

Title: Absorption bandwidth enhancement technique using stacked unequal cross-shaped graphene absorber

Author: Mohsen Daraei O.; Rezaei P.; Khatami S.A.; Zamzam P.; Mohapatra S.; Appasani B.; Khani S.

Details: Vol. 21, December 2025

Abstract: Terahertz metamaterial absorbers (TMAs) are gaining considerable attention due to their unique characteristics. Graphene-based absorbers are a subclass of TMAs that exhibit tunable absorption characteristics for myriad applications. This paper proposes a TMA consisting of two layers of graphene in a cross-shaped structure where the absorption can be modified by altering the chemical potential of the graphene layers. A quarter-wave impedance transformer has been utilized to attain optimal absorption in the vicinity of the central frequency of this absorber. Also, the transmission line theory has been considered to verify the absorption level achieved around the central frequency. The conductivity of the graphene layer is changed by altering the levels of chemical potential; the Fermi levels for the upper and lower layers of the graphene cross-shaped THz absorber have been considered 1 eV and 0.3 eV, respectively, to achieve maximum absorption. Therefore, the bandwidth of this absorber reached 1.74 THz, around 7 THz as the central frequency. The proposed asymmetric stacked graphene structure provides broadband, polarization-insensitive, and electrically tunable absorption around 7 THz, making it highly suitable for applications such as THz imaging, sensing, and electromagnetic signature reduction technologies. Compared to prior designs, it offers improved bandwidth, tunability, and angular stability, making it a compact and practical solution for next-generation terahertz systems.



URL: https://www.sciencedirect.com/science/article/pii/S2666950125001002?via%3Dihub