



## SCHOLARLY PUBLICATIONS

### School of Electronics Engineering

### KIIT Deemed to be University

**Journal Name:** IEEE Transactions on Consumer Electronics

**IF:** 10.9

**Title:** Fairness-Aware Medical Image Analysis for Consumer Electronics under Imbalanced Data

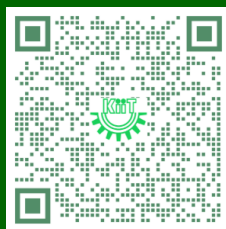
**Author:** Yu, Y.; Liu, C.; Chakraborty, C.; Manisha, M.; Ding, F.

**Details:** January 2026

**Abstract:** Consumer health electronic systems increasingly rely on the seamless integration of sensing, communication, computing, and control to deliver intelligent, adaptive, and context-aware services. However, under imbalanced environments and heterogeneous network conditions, these integrated systems often exhibit performance disparities that affect reliability and user trust. In this paper, we propose a novel framework for fair and robust integration of sensing, communication, computing, and control in consumer health electronics. Our approach adopts a three-fold strategy: (i) feature disentanglement to separate environment-dependent signals from task-relevant features, reducing bias in sensing and decision-making; (ii) a fairness-aware optimization scheme that balances resource allocation across diverse devices and network conditions, ensuring equitable performance; and (iii) loss landscape flattening through sharpness-aware optimization to enhance robustness against distribution shifts in communication channels and computing platforms. Extensive experiments on representative IoT and edge-computing benchmarks demonstrate that our method significantly improves both fairness and stability across heterogeneous consumer health scenarios, providing a promising direction for equitable and reliable smart device ecosystems.



**URL:** <https://ieeexplore.ieee.org/document/11354484>





## SCHOLARLY PUBLICATIONS

### School of Electronics Engineering

### KIIT Deemed to be University

**Journal Name:** Biomedical Signal Processing and Control

**IF:** 4.9

**Title:** Adaptive weighted CEEMDAN-driven vibroacoustic augmentation and classification for precise, multiclass knee osteoarthritis assessment

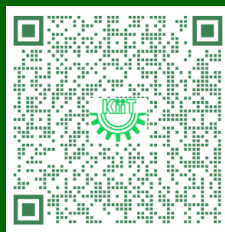
**Author:** Jha, P.K.; Kumar, V.; Sahoo, J.; Kanagaraj, S.

**Details:** Volume 115, April 2026

**Abstract:** Background: Knee osteoarthritis (OA) is a significant global health burden, causing pain, disability, and rising healthcare costs. Conventional imaging (e.g., X-ray, MRI) is effective yet expensive and not ideal for routine monitoring. Vibroarthrography (VAG), which analyses knee joint acoustic emissions (AE), offers a promising non-invasive, cost-effective alternative; however, its diagnostic performance hinges on robust signal decomposition and feature extraction. Methods: This study proposes a novel Adaptive Weighted Complete Ensemble Empirical Mode Decomposition with Adaptive Noise (AWCEEMDAN) framework to enhance VAG-based OA assessment. Combined with adaptive envelope distortion and segment-based micro-shifting augmentation, AWCEEMDAN reduces noise, mode mixing, and baseline wander while emphasizing transients linked to chondral damage and osteophyte impact. We analysed 120 original and 300 augmented AE signals spanning Normal to KL Grades 1–4 using unsupervised clustering and supervised machine-learning classifiers. Results: AWCEEMDAN with augmentation outperformed traditional EMD and ICEEMDAN, yielding cleaner signals and more distinct patterns across Normal and KL Grades 1–4. Classifiers trained on the resulting features achieved high diagnostic performance, with accuracies up to 97 %. The improved features enabled clearer separation between early and advanced OA stages. Conclusions: This methodology improves knee OA detection and staging by capturing transient, high-frequency signals and supports refined severity stratification for clinical decision-making. Future research will expand patient demographics, incorporate additional clinical variables, and optimize computational methods for real-time use.



**URL:** <https://www.sciencedirect.com/science/article/pii/S1746809425019287>





## SCHOLARLY PUBLICATIONS

### School of Electronics Engineering

### KIIT Deemed to be University

**Journal Name:** IEEE Antennas and Wireless Propagation Letters

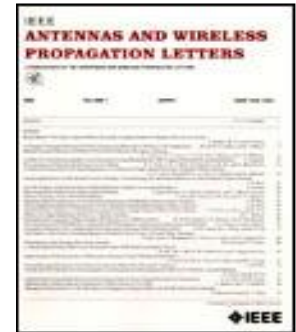
**IF:** 4.8

**Title:** A Space-Efficient Quad-Polarized Circular Patch MIMO Antenna for 5G-n46/WLAN Applications

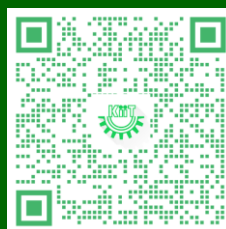
**Author:** Badi, S.K.; Acharya, O.P.

**Details:** volume 25, Issue 1, January 2026

**Abstract:** This letter presents a circular patch antenna designed for multiple-input–multiple-output (MIMO) applications, featuring four coaxial probe feeds spaced  $90^\circ$  apart to achieve high space efficiency and quad-orthogonal polarization diversity. The antenna maintains a minimum acceptable interport mutual coupling of  $-15.5$  dB through an internal decoupling technique, which involves loading a planar magneto-electric structure onto the patch surface. Operating within the 4.93 GHz to 5.71 GHz band, the antenna offers a 14.66% bandwidth, making it suitable for sub-6 GHz 5G-n46 and wireless local area network (WLAN) applications. The design is further extended to a two-element MIMO configuration with extremely compact interelement spacing. Detailed parametric analysis of the matching and decoupling mechanisms are provided, supported by surface current distributions that demonstrate polarization diversity and 3-D radiation patterns that confirm pattern diversity. Key diversity performance metrics, including envelope correlation coefficient, mean effective gain ratio, channel capacity loss, and total active reflection coefficient are all found within acceptable limits. Simulated results from CST closely align with measured data, validating the proposed design.



**URL:** <https://ieeexplore.ieee.org/document/11208588>





## SCHOLARLY PUBLICATIONS

### School of Electronics Engineering

# KIIT Deemed to be University

**Journal Name:** IEEE Sensors Journal

**IF:** 4.5

**Title:** A Neuro-Entropy-Driven Nature-Inspired Framework for Adaptive Privacy and Lightweight Security in Sensor Devices

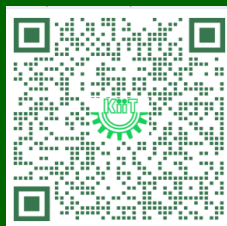
**Author:** Othman, S.B.; Chakraborty, C.; Singh, S.; Frikha, M.A.

**Details:** February 2026

**Abstract:** Sensor devices and Internet of Things (IoT) devices face a critical, fundamental challenge: deploying robust security while operating under severe constraints on energy, processing power, and memory. This paper presents BioEnS (Bio-Entropy Security), a novel, closed-loop framework designed to overcome the inherent Security-Privacy-Efficiency trilemma by achieving Pareto-optimal adaptive security. BioEnS models adaptive defense as a real-time, constrained multi-objective optimization problem, dynamically resolving the trade-off between security assurance ( $\Phi$ ) and resource consumption ( $\Psi$ ) based on current context. The framework core relies on a Hardware Root-of-Trust Entropy Source (HRTES), which provides a quantifiable PUF-derived min-entropy rate ( $\epsilon_{rate}$ ) for nondeterministic key derivation, feeding into an Adaptive Security Manager (ASM). This mechanism rigorously enforces context-dependent security requirements ( $\Phi_{req}$ ) through a dominant  $\lambda$ -penalty term, enabling ultra-low-latency policy decisions. Experimental validation on an ARM Cortex-M platform demonstrates exceptional performance: BioEnS maintains a near-zero Security Violation Rate (0.02%) while simultaneously yielding a superior Lifetime Extension Ratio of 0.69 $\times$  relative to the high-security baseline, confirming the validity of the guaranteed policy enforcement.



**URL:** <https://ieeexplore.ieee.org/document/11370320>





## SCHOLARLY PUBLICATIONS

### School of Electronics Engineering

### KIIT Deemed to be University

**Journal Name:** IEEE Microwave Magazine

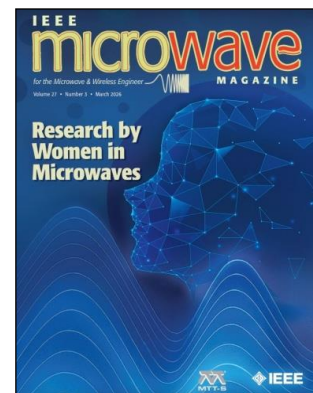
**IF:** 3.7

**Title:** IEEE Antennas and Propagation Society and IEEE Microwave Theory and Technology Society Bhubaneswar Joint Chapter Inauguration

**Author:** Paul, A; Sahu, S; Saha, C

**Details:** Volume 27, Issue 3, March 2026

**Abstract:**



**URL:** [https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=11372510&utm\\_source=clarivate&getft\\_integrator=clarivate&tag=1](https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=11372510&utm_source=clarivate&getft_integrator=clarivate&tag=1)





## SCHOLARLY PUBLICATIONS

### School of Electronics Engineering

# KIIT Deemed to be University

**Journal Name:** Silicon

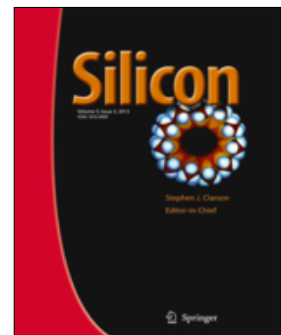
**IF:** 3.3

**Title:** Exploring the Sensitivity of L-Shaped Channel Tunnel FET Based pH Sensor of Bio-Electrolyte Detection

**Author:** Singh, S.S.; Sahu, P.K.

**Details:** January 2026

**Abstract:** A novel L-shaped channel Tunnel field effect transistor (TFET) has been explored and examined to be used as a pH sensor for the detection of pH levels in human fluids. The L-shaped channel structure relies on vertical and corner tunneling, enabling current conduction along the L-shaped direction. The electrical performance of the device is evaluated by defining its physical parameters, such as the electric field, potential, and energy band diagram. The pH model has been developed to calculate the density of states for use in the ATLAS simulator as a function of electrolyte pH. Due to its L-shaped channel structure, it exhibits very steep switching characteristics with a very low subthreshold slope (10 mV/dec). The output current sensitivity and threshold voltage sensitivity are also evaluated using the responsive voltage. The voltage sensitivity of the proposed pH sensor is 12 times (approximately 357 mV/pH) higher than the Nernst limit (59 mV/pH). In addition, at higher temperatures ( $T = 400$  K), the proposed structure is reliable and shows less variation.



**URL:** <https://link.springer.com/article/10.1007/s12633-025-03605-z>

