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Editorial

Smart Antennas and Intelligent Sensors Based Systems: Enabling Technologies and Applications, 2020

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The present Industry 4.0 revolution, as well as advances in IoT and Sensors Technologies, has made human life easier and more convenient. Controlling, monitoring, and analyzing real-time systems for a range of applications, including the COVID-19 pandemic, health monitoring, and smart homes, have become possible because of smart antennas, intelligent sensor communication, and computing-based networks. Smart antennas and intelligent sensor-based systems offer a variety of applications in multiuser communication, particularly in unpredictable and unforeseen conditions [1]. Smart antennas have been widely employed in adaptive beamforming, in which the main beam must be focused in a certain direction and nulls must be handled in unwanted directions [2]. The integration of smart antennas and intelligent-based sensor networks allows for the development of various algorithms that may be utilized for environmental decision-making, sensing, and monitoring [3–5]. For contactless epidemic illness monitoring, breathing difficulties detection, and COVID-19 forbidden activities recognition, smart antenna and intelligent sensors are a key area of research.

The main focus of this special issue is to give a broad perspective on current research in the fields of smart antennas and intelligent-based sensor networks in order to enable new technologies and applications.

We strongly encouraged specific academics to submit studies on intelligent sensors and smart antenna-based devices. As a result, this special issue highlights the most up-to-date research in this field.

The paper "A Novel Deceptive Jamming Approach for Hiding Actual Target and Generating False Targets" describes a new method for hiding the actual target while simultaneously producing several false targets against FDA radar. The modified FDA radar is expected to be mounted aboard the actual aircraft for this purpose. To take advantage of FDA radar's range-dependent pattern nulling capabilities, it intercepts the opponent's radar signals and broadcasts back to place nulls in the radiation pattern at the required range and direction. To deceive the opponent's radar system, the proposed deceptive jammer creates delayed versions of received signals to create bogus targets with varied ranges.

The paper "On the Performance of Self-Concatenated Coding for Wireless Mobile Video Transmission Using DSTS-SP-Assisted Smart Antenna System" describes a novel approach to the concept of self-concatenated convolutional coding (SECCC) with sphere packing (SP) modulation using DSTS-based smart antennas. For the Rayleigh fading channel, the suggested DSTS-SP SECCC scheme is tested. With the help of an interleaver, the SECCC structure is created using the recursive systematic convolutional (RSC) code. Extrinsic Information Transfer (EXIT) curves are used to study the proposed system's convergence behavior. The suggested system's performance is measured using the H.264

standard video codec. The DSTS-SP SECCC's perceived video quality is determined to be much superior than the DSTS-SP RSC's.

The study "On the Performance of Wireless Video Communication Using Iterative Joint Source Channel Decoding and Transmitter Diversity Gain Technique" described a wireless video communication system based on iterative joint source channel decoding (IJSCD). The sphere packing (SP) modulation assisted differential space-time spreading (DSTS) multiple input-multiple output (MIMO) technique is used in the projected transmission system. By maintaining the maximum possible Euclidean distance between the modulated symbols, the SP modulation-aided DSTS transmission mechanism achieves substantial diversity gain. Furthermore, because no channel estimation mechanism is used, the suggested DSTS system results in a low-complexity MIMO scheme. Various combinations of IJSCD error protection schemes helped by source bit coding (SBC) have been utilized, all with the same total bit rate budget.

The paper "Dimensionality Reduction for the Internet of Things Using the Cuckoo Search Algorithm: Reduced Implications of Mesh Sensor Technologies" highlights a problem in the Internet of Things network and presents a unique cuckoo search-based outdoor data management system. The feature extraction approach is used to extract useful information from unstructured and high-dimensional data. After the cuckoo search-based feature extraction is implemented, a few test benchmarks are provided to assess the performance of mutant cuckoo search algorithms. As a result of the low-dimensional data, classification accuracy is improved, while complexity and expense are lowered.

The study "A Comparative Analysis of Different Outlier Detection Techniques in Cognitive Radio Networks with Malicious Users" presents a new type of malicious user, the lazy malicious user (LMU), which has two phases of operation: awake and asleep. Statistical analysis is used to detect anomalous user behavior and mitigate its negative consequences. In the presence of the LMU and opposing types of malevolent users, results for various hard combination techniques are obtained. The results of simulations for error probability, detection probability, and false alarm at various levels of SNRs and varying contributions of the LMUs and OMUs indicated that the median test outperforms the other outlier detection techniques in MU detection.

The study "Nonorthogonal Multiple Access for Next-Generation Mobile Networks: A Technical Aspect for Research Direction" reviews and compares the basic principle of NOMA with other orthogonal multiple access technologies (OMA). In the most recent NOMA plan, a complete survey is offered. The design principles of NOMA schemes are covered, as well as recent deployments. Furthermore, the bit error rate, system capacity, and energy efficiency of the systems are compared. NOMA can meet the required goals in terms of user data rate, system capacity, interference cancellation technique, and reception complexity, according to the performance findings.

The study "Bodacious-Instance Coverage Mechanism for Wireless Sensor Network" suggested a Bodacious-instance Coverage Mechanism (BiCM) based on instance (node) redeployment. In the coverage region, the suggested technique creates new instance positions. It has two stages: in the first, it uses the Dissimilitude Enhancement Scheme (DES) to locate the intended instance position and move the instance to a new location, and in the second, it uses the depuration to reduce the moving distance between the initial and intended instance positions. Furthermore, the optimal parameters for several BiCM characteristics such as loudness, pulse emission rate, maximum frequency, grid points, and sensing radius have been discovered.

A new notion of CLC to IBC heterogeneous generalized signcryption is presented in the publication "A Lightweight Nature Heterogeneous Generalized Signcryption (HGSC) Scheme for Named Data Networking-Enabled Internet of Things." The proposed method delivers security features based on situational requirements while being compliant with NDN's structural policy. Given the resource constraints of IoT, a lightweight elliptic curve cryptosystem called the hyperelliptic curve cryptosystem is utilized, which provides the same level of security as bilinear pairing and an elliptic curve cryptosystem with a small key size.

Game theory was applied to develop the performance of intrusion detection systems in the study "Intrusion Detection into Cloud-Fog-Based IoT Networks Using Game Theory." The infiltration mode of the attacker and the behavior of the intrusion detection system are examined as a two-player nonparticipatory dynamic game, with Nash equilibrium solutions employed to generate specific subgames. Various parameters were investigated during the simulations utilizing game theory and Nash equilibrium definitions to extract the parameters with the most accurate detection findings. The results of the suggested method's simulation demonstrated that using intrusion detection systems based on cloud-fog in the Internet of Things can be extremely effective in recognizing attacks with the least number of errors in this network.

An intelligent moth flame optimization-based clustering (IMOC) for a drone-assisted vehicular network is presented in the paper "IMOC: Optimization Technique for Drone-Assisted VANET (DAV) Based on Moth Flame Optimization." This method is utilized to give maximum coverage for the vehicular node while using the fewest cluster heads (CHs) possible. The key topic addressed in this article is delivering optimal route by offering end-to-end connectivity with minimal overhead. The performance indicators used for comparison study are node density, grid size, and transmission ranges. These parameters were adjusted for each algorithm during simulations, and the results were recorded. Ant colony optimization, comprehensive learning particle swarm optimization, and gray wolf optimization were used to compare state-of-the-art clustering techniques for routing.

The study "IoT-Based Healthcare Support System for Alzheimer's Patients" employed a variety of communication protocols between sensors and smartwatch, including Message Queue Telemetry Transport (MQTT) and WebSocket (with authentication and auto closing of connection). Doctors, patients, and ambulances may all be tracked using the

secure backend admin panel. These protocols are established with security in mind to preserve patients' privacy.

In the work "A New Computing Paradigm for Off-Grid Direction of Arrival Estimation Using Compressive Sensing," a method for solving grid mismatch or off-grid target for direction of arrival (DOA) estimation using compressive sensing (CS) methodology is offered. The sources are located at a few angles in comparison to the full angle domain, i.e., they are spatially sparse sources, and their position can be estimated using CS approaches that can achieve super resolution and estimation with a lesser amount of samples. The source energy is spread among the adjacent grids due to grid mismatch in CS approaches, and a fitness function based on the difference of the source energy among the adjacent grids is introduced.

The paper "Management of Load-Balancing Data Stream in Interposer-Based Network-on-Chip Using Specific Virtual Channels" describes a strategy for avoiding the aforementioned interference by designing two different virtual channels and several links that control which memory block is accessed. When employing the interposer layer, our method uses the destination address to determine which channel and link should be used. When compared to typical load-balancing and unbalanced systems, simulation results demonstrate that the suggested mechanism reduces latency by 32% and 14%, respectively.

The goal of the study "Presenting an Effective Method to Detect and Track the Broken Path in VANET Utilizing UAVs" is to simulate a VANET in an urban area using cloud computing infrastructure and unmanned aerial vehicles (UAV) to prevent the negative impact of packet delivery and routing barriers. To assess the proposed method, it is compared to the ClouDiV basic protocol. The proposed technique outperforms other methods with varying densities and variable times in terms of efficiency and performance, according to Ns-2 simulation findings.

The study "Support Vector Machine-Based Classification of Malicious Users in Cognitive Radio Networks" proposes a support vector machine (SVM)-based machine learning approach to categorize valid SUs and MUs in the CRN. Both classification and regression are accomplished using the proposed SVM-based approach. By drawing a hyperplane on the base of greatest margin, it clearly classifies authentic SUs and MUs. The sensing data from the valid SUs are integrated at the FC using Dempster-Shafer (DS) evidence theory after successful classification. Simulations are used to demonstrate the effectiveness of the proposed SVM-based classification technique when compared to existing systems.

Conflicts of Interest

There is no conflict of interest.

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