Introduction

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Biographical notes: R. Jothikumar is a Professor in the Department of Computer Science and Engineering at Shadan College of Engineering and Technology, Peerancheru, Hyderabad. He has completed his Doctoral degree from the Noorul Islam Centre for Higher Education, Nagercoil, Tamil Nadu, in 2017 and MTech in CSE from Dr. M.G.R. University, Chennai. Currently, he is having 18 years of teaching experience in various premier institutions. He has published around 27 Scopus and SCI indexed journals and two patents. He is also currently extending his editorial support for the journals as a guest editor for many journals.

Krishnamoorthy Venkatesan is currently working as an Associate Professor in the Arba Minch University, Arba Minch, Ethiopia. He has the teaching experience of nearly 20 years in various engineering colleges in India. He has published more than ten Scopus indexed papers in many international journals. Also, he has published more than eight conference papers. He is serving as a board member for Algebra subject, represented as a Student Counsellor for the Arba Minch University and acted as external examiner for PhD Viva-Voce Examination for Ethiopian University. He has evaluated more than eight PhD theses as a foreign examiner and reviewed more than ten research articles in different journals. He is also serving as a guest editor and editorial board member for few international journals.

R.V. Siva Balan is a Professor at the Department of Computer Science and Information Technology, JAIN (Deemed-to-be-University), Jayanagar, Bangalore, 560069. He has 14 years of successful experience in teaching and research with an extensive pool of knowledge. He has published more than 42 Scopus and eight SCI indexed papers in well reputed journals. He guided eight doctoral scholars and they have successfully completed their doctoral degrees and three research scholars are doing their research currently. He is also serving as an editorial board member for various journals.

These issue deliberated by many of the authors are of boundless significance. Our team of the guest editors played major role in releasing the issue with high quality. After the screening process and initial survey, we have carefully chosen 17 manuscripts for the further review and modification process. Finally, 11 papers were selected which are with high quality of concept and content, and accepted for contributing in the special issue. Also, six papers were rejected, which does not meet the manuscript requirements. We would like to convey our sincere thanks to all the reviewers for their infinite efforts and contributions. Also, we thank the authors for contributing their quality works for this special issue. The papers and the concepts shared in this issue are highly relevant, precise and timely for the special issue. This is a useful area for the current trend of life and we believe that this issue will inspire the future work in order to gain better understanding.

The special issue is on the title 'Modern research, design and implementation in high/wide and ultrawide band

antennas and propagation'. The subjects and topics covered in this special issue include ultra-wideband (UWB)-based hybrid models, wide band systems design and optimisation, UWB hardware architecture, antennas design and modelling, UWB in desktops, laptops and in connecting accessories, UWB networking, communication of indoor and wireless LAN (WLAN), implementation, testing and fault analysis in UWB systems, UWB and positioning, geolocation and localisation, UWB for commercial and military communications, UWB-based communication in IoT and cloud applications, UWB simulation, fading channel and portable mobile systems, sensors, transmitters and receivers designs in UWB, UWB pulse generation, modelling and optimisation, ground and object penetrating UAB radars, speech, biomedical signal processing and coding in UWB, UWB-based wireless personal area networks (WPANs), UWB security systems and measurement applications, advancements in UWB equipment's, UWB-based surveillance systems, hand held UWB devices and applications, indoor, outdoor and hybrid UWB devices, other related case studies and applications, etc.

1   The article by G. Asha and S.K. Srivatsa describes a novel design for MANETs, to design a good topology, the hierarchy of communication, discovering routes and links of high quality are some of the considerations in protocol design. The proposed work introduces an innovative path selection algorithm that incorporates both QoS parameters and topology-aware protocols. The proposed algorithm secures the path and connectivity between the nodes with a fast retransmission algorithm. The protocol is simulated with different speeds, number of nodes, data range, and distance between all the nodes in an NS2 simulator.

2   The paper by Sukumar Rajendran et al. describes about healthcare assessment and diagnostics on comorbid patients. Various difficulties for location finding and indoor signalling necessitate compact and low-cost UWB sensor technology. During a crisis, we engage in position estimation, or exact GPS positioning, by using LOS and NLOS via diffraction and reflection of UWB signals. In a UWB-based system, edge/fog computing is utilised to analyse the indoor/outdoor usage of quarantine patients, which eliminates the threat of transmission. UWB sensors with anchors and tags are used to represent different movement patterns, which are then mathematically modelled. Classification accuracy with SVM is increased while also assisting frontline medical workers in containing pandemics using human interaction.

3   Alahari Radhika et al. describes, about the wireless communication systems, matrix inversion is a common technique used to solve systems of linear equations. In addition, OMP compressive sensing is preferred for receiver-side signal reconstruction. The fixed-point accuracy and performance rate of fixed-point arithmetic restrict its use in many real-time applications. In this

paper, floating-point enabled systolic array implementation of iterative QR decomposition (QRD) is proposed for matrix inversion. By employing floating-point optimisation techniques and parallel systolic implementation, the overall computational efficiency is increased. The proposed QRD architecture offers the highest throughput and errorless FPU computation in matrix inversion by exploiting the systolic array's inherent metrics.

4   M.P. Haripriya and P. Venkadesh proposed an IoT-based trust aware B-tree Goldwasser-Micali cryptographic node authentication (IoT-TBTGMCNA) technique is developed for secured communication in 5G mobile networks with higher accuracy. An IoT-TBTGMCNA technique uses connected IoT devices to calculate the trust value of mobile nodes (i.e., mobile nodes). Nodes are organised into B-trees according to trust. Insertion and removal of mobile nodes are based on deployment. The IoT-TBTGMCNA technique has three phases: key generation, distribution and node authentication. The Goldwasser-Micali cryptographic algorithm is used in the key generation phase. Goldwasser-Micali encryption algorithm enciphers the key and transfers it to the child node.

5   Trigunesh Narzary et al. propose an electrostatically actuating capacitive RF MEMS switch with a rare step structure and meander spring, where the effective spring constant is 1.45 N/m. Simulations were carried out to investigate the operation of the switch, based on key parameters like actuation voltage, switching time, and s-parameters. The proposed switch achieved a 4.44 V actuation voltage with ZrO_2, 4.38 V with Nb_2O_5, and 3.88 V with TiO_2. The switching time of 52 µs is used to switch from ON to OFF-condition. The suggested switch was isolated at –41.85 dB at 3 GHz with TiO_2 as a dielectric and insertion loss of –0.01 dB to –0.16 dB for all the configurations of the designed switch. In the frequency range of 1–30 GHz, the return loss of the ZrO_2 dielectric switch was found to be –51.32 to –37.68 dB. For dielectric Nb_2O_5, the return loss at 1–30 GHz is –60.73 to –25.42 dB, while for dielectric TiO_2, it is –47.16 to –19.34 dB. The proposed capacitive radio frequency MEMS switch fits well for high radio frequency cellular communication applications.

6   Abdullah Saleh Alqahtani describes about MANET, node within its transmission range can be communicated directly and the nodes that are out of its transmission range may be communicate via other intermediate nodes. The existing popular reactive AOMDV protocol in MANET, suffers routing Overhead due to flooding of RREQ and RREP packets. AOMDV is often used in MANET's reactive routing protocols. The node uses energy to receive and forward data packets. Node energy level draining or node movement out of range may cause path loss. To overcome this drawback, we propose an algorithm with

enhanced energy and channel awareness (EECALB) routing protocols, which multicasts RREQ packets to a select group of neighbour nodes. Neighbour nodes are selected based on channel, node energy level and existing load analysis. The proposed algorithm will establish a stable path, which overcomes path loss and distributes load for multipath, and in efficient transmission between source and destination.

7   Siddhanta Borah et al. proposes UWB-based hardware prototype model using a novel image extract algorithm (IEa). This simplified algorithm is proposed to solve the pest problem in cassava farming land in eastern India, Nagaland. A prototype device was built around the Raspberry Pi 3 B+ board, which supports IEEE 802.11.b/g/n/ac WLAN. Pesticides are sprayed using a nozzle system once the pest is detected. For consistent spray control, a single pole double throw (SPDT) relay is used. Time consumption is less when IEa is implemented compared to other similar existing algorithms to protect agriculture crops from pests. The device's total processing time to identify pests in an agriculture field was discovered to be 17.10 seconds. The device was tested from April–June 2020 in a cassava crops field in Dimapur, Nagaland, India.

8   G. Aparna coding techniques to overcome the effects of the channel behaviour as well as to improve the performance in terms of speed, design, hardware efficiency, throughput and flexibility. Here, a hardware implementation of polar codes using efficient hardware structures and the algorithm selected to meet the LLR condition for successive cancellation list decoding is described. Using the SCLD method supports improved error correction performance of polar codes. However, increasing block sizes increases the hardware complexity to address the list decoding process to obtain low latency. To perform a polar code implementation with SCLD method and LLR approach, a VLSI architecture was designed and simulated on an HDL synthesiser on the target FPGA device XC6vlx760-1-ffl760 for analysing various code lengths N[128, 256, 512] as inputs and code rates R[1/6, 1/3, 1/2].

9   Sukumar Rajendran et al. describes the location-based identification of entities to provide support at the point of need and in real-time. Indoor parking can be challenging because of complex scenarios and space availability depending on the building, location and size. For a specific layout, UWB provides centimetre-level positioning with relative accuracy using tags and anchors. In this paper, a specified indoor parking layout is identified with graph entities by visualising the trajectory through Simulnet. The NLOS/LOS signal is used to differentiate whether parking lot slots are occupied or free. A more organised parking space was established by detecting paths with graph edge nodes. This proposed algorithm provides real-time dynamic parking space monitoring with high accuracy.

10 K.G.M. Pradeep et al. describes about the wireless sensor network for structural health analysis system reduces the installation and maintenance costs compared to a wired sensor system. These sensors are used to detect damages in the building and report to the base station. Building damages are detected early and subsequent actions are taken to avoid disaster. Large numbers of various sensors are strategically placed around the building infrastructure. Initial sensors are in active state, but additional sensors are activated when damage is detected. The cluster gathers all the sensor data and consolidates it before making a final decision and sending it to the base station for necessary actions. Health monitoring system implemented using WSN will efficiently detect earthquakes, loads, stress and corrosion.

11 S. Roopa and E. Kiran Kumar proposed a novel flexible conical liquid antenna fed by a probe pin. Three types of liquids are tested with the proposed antenna to get a voltage standing wave ratio of 1:2 over a frequency range of 300–850 MHz. The results verify that a compact, inexpensive conical antenna yields a wide range of frequencies with low radar cross section and omnidirectional radiation patterns. The experimental results attained a gain of 2 dBi which is assumed to be close to the simulation results that showed a gain of 1.89 dBi. Additionally, it is common to measure the patterns of different antenna types using network analysers.