Foreword and Editorial

International Journal of Future Generation Communication and Networking

We are very happy to publish this issue of an International Journal of Future Generation Communication and Networking by Science & Engineering Research Support Society.

This issue contains 22 articles. Achieving such a high quality of papers would have been impossible without the huge work that was undertaken by the Editorial Board members and External Reviewers. We take this opportunity to thank them for their great support and cooperation.

In the paper “Research on a Localization Algorithm Based on Wireless Sensor Network”, after analyzing the disadvantages of the centralized multidimensional localization algorithms MDS-MAP (Multi-Dimensional Scaling-MAP) in positioning accuracy and computational complexity, they present a new localization algorithm based on a set of statistical vectors (SV). The solving equation of the double centered matrix can be simplified by node coordinate transformation. In order to reduce the noise disturbance and decrease the effect of ranging error on the followed location accuracy, a new coordinate inner product matrix can be reconstructed by using a set of statistical vectors, which can be used to calculate the node coordinates directly. This algorithm can realize centralized localization, distributed localization and incremental localization of nodes.

The paper “4G Wireless Networks Architecture an Overview and Security Issues On 4G” presented a comprehensive study on current proceeds in wireless network security problems or issues for 4G are being presented. Mobility is the most invigorating character, and it has a vast impact as how communication is embryonic into the future 4G long term Evolution networks and the mobility in 4G networks demands new mobility support. LTE is designed with strong cryptographic techniques, mutual authentication between LTE network elements with security mechanisms built into its architecture. The paper has a lot of contribution in different field of wireless network as in current era wireless network technologies have expanded rapidly and the emergence of novel applications such as tablet, Smartphone, mobile TV, web 2.0 and streaming contents such as videos, games and more, led to the demand of a faster network of next generation technology, the fourth Generation (4G) the new technology or generation of mobile communication standards in telecommunication emerging from future wireless networks which works under LTE (Long Term Evolution) and WiMAX (Worldwide Interoperability for Microwave Access).

In the article “Ad Hoc Network Routing Algorithm Based on Energy Balanced Connected Dominating Set”, CONNECTED Dominating Set (CDS) is an important means to alleviate the broadcast storm of wireless sensor network. Compared to non-CDS internal nodes, CDS internal nodes have faster energy consumption rates, therefore, the energy level of CDS internal nodes determines the life circle of the network. However, the current CDS algorithms only focus the scale of CDS, and the dominator node of energy level are not considered. For this, this article puts forward the Energy-balance-based Connected Dominating Set Distributed (ECDSD) algorithm. CDS is built based on Weighted Coverage Cost (WCC), which contains the detected energy of neighboring nodes. The nodes with higher WCC values are selected as dominator nodes.
Paper “Design and Realization of the Advanced Distributed Localization Algorithm Based on MDS-MAP for WSNs”, aiming at the deficiencies of the classical MDS-MAP algorithm in Wireless Sensor Networks, an advanced distributed localization algorithm (AMDS-MAP(D)) was designed and realized based on classic MDS-MAP algorithm in this paper. This algorithm is implemented mainly through the node classes, the main variables which is used in the algorithm was defined in the node classes, while the main messages did. The realization of the algorithm was given and the complexity of the algorithm was obtained through the analysis.

In the paper “Enhancement of Degraded Manuscript Images using Adaptive Gaussian Thresholding”, manuscripts in physical form are easily damaged over time resulting in loss of important information. Hence, there is a need to preserve the knowledge these manuscripts hold by enhancing the readability of the damaged manuscript by applying various image analysis techniques and storing them in digital form to prevent further deterioration of manuscript information. There are multiple well-known methods for document enhancement but, they are not suitable for use in enhancing damaged manuscript images. they propose a novel method to address the problem of enhancement and binarization of degraded manuscript images that applies a dual filtering technique for noise removal, Gaussian based adaptive thresholding technique and post processing using morphological operations that enhances readability of manuscript images. Their method showed good performance on qualitative as well as quantitative evaluation performed on 27 digital manuscript images with uniform character formation and an overall pseudo F-measure of 60.12%. Furthermore, their method is also compared with other well-known document enhancing techniques to establish the better applicability of their technique to preservation of manuscript information.

In the study “Research on ZigBee Technology in Mountainous Agriculture”, in recent years, China vigorously has developed precision agriculture, but encountered a number of problems. For example, there are a lot of agricultural bases in the mountains in China, how to carry out the development of precision agriculture in the mountains is a difficult problem. In this paper, they design a fine agricultural wireless monitoring system based on ZigBee wireless sensor network which is suitable for mountain agriculture by using ZigBee technology. The system realizes the real-time collection of the environmental parameters of the unattended agricultural base. The system adopts multilevel tree cluster network architecture. Users can access the system at anytime and anywhere through the smart phone or PC computer.

The paper “LBT Enhancement for LTE-LAA Fair Coexistence” states that a common approach to increase wireless network capacity is to use additional spectrum. LTE in the unlicensed spectrum band has been introduced in the release 13 of 3GPP as Licensed Assisted Access (LAA). The LTE technology in the unlicensed band is enabled by Listen Before Talk (LBT) procedure for fair coexistence with other wireless technologies (i.e., Wi-Fi) operating in the same spectrum. LBT based on binary exponential back-off known as LBT category 4 can achieve a fair coexistence in low buffer but presents some limitations under full buffer evaluation. In this paper they propose different LBT mechanisms and evaluate their performances based on 3GPP coexistence scenarios (LAA/Wi-Fi, LAA/LAA).

In the study “Automatic Modulation Recognition of Communication Signals”, modulation identification of communication signals is an important content of the electronic countermeasure procedure and a hot topic in the research field of signal processing. Generally speaking, the essential problem of communication signals' recognition is a pattern recognition problem. In these paper, Firstly, the feasibility of the improved method
to distinguish between analog modulation signals and digital modulation signals based on Haar Wavelet Transform (HWT) is demonstrated. Secondly, an identification method of analog modulation signals based on the higher order moment of envelope and the spectrum symmetry is presented. Thirdly, an identification method of digital modulation signals using high-order cumulants is suggested. Finally, an experiment is designed to prove the validity of the research theory.

Authors of the paper “Design of Body Temperature and Pulse Data Acquisition System Based on SimpliciTI Wireless Network Protocol” introduced the application of SimpliciTI technology. Study and discuss the feasibility of applying SimpliciTI network to the field of medical treatment and monitoring. The introduction of SimpliciTI network protocol is a good supplement to the existing wireless communication network technology. Its low power consumption and low cost will greatly promote the development of wireless network technology. A temperature and pulse data acquisition system based on SimpliciTI wireless network protocol is proposed by using these features, the system hardware platform is developed using the chip of TI’s MSP430F2274. Temperature sensor and pulse sensor on the terminal node to collect physiological data of human body, through wireless transmission to the final realization of the hospital patient's physiological information collection and diagnosis. The development of this system can effectively solve the problem of low efficiency in clinical treatment and nursing during the detection of temperature and pulse. It has high theoretical significance and practical application value.

In the paper “A Teaching Learning Based Optimization Algorithm for Cluster Head Selection in Wireless Sensor Networks”, in wireless sensor networks, clustering techniques are widely used for cluster heads selection and also to reduce power consumption. Therefore, these techniques are applied to increase network life time and optimum number of CHs. In this work, teaching learning based optimization (TLBO) algorithm is adopted for finding the optimum number of cluster heads in a sensor field. Another, objective of this algorithm is also to reduce power consumption and increase the network life time. The proposed algorithm is integrated with LEACH protocol, called LEACH-T and considers the residual energy for selecting the CHs. Simulation results show that the proposed algorithm enhances the network life time by reducing the power consumption during packets transmission. It is also observed that the proposed algorithm is an effective and efficient algorithm for CHs selection.

The paper “Mobile Node Discovery Auxiliary Communication of 6LoWPAN”, based on mobility support of IPv6 and node discovery mechanism, this paper proposes a method using node discovery mechanism for mobile node auxiliary connection, in which they detect the real-time received signal strength indicator, by computing and analyzing the change of average value to predict variation trend. In addition, they drew up a new generation of Internet protocol implementation scheme in 6LoWPAN, which is the access of the combination of the mobile node and IoT gateway, etc. In the local IoT, things connect with IPv6, which satisfy the demand of mobility, the whole IoT architecture model of IPv6 connection will be implemented. The analysis and evaluation of network performance was completed in Cooja simulator based on Contiki system after the hardware test.

In the research entitled “Research on the Enterprise Resource Management System and Auxiliary Performance Evaluation Mechanism based on Oracle Database Optimization and Security Enhancement”, in this research, they propose the novel enterprise resource management system and the auxiliary performance evaluation mechanism based on Oracle database optimization and security enhancement. Database optimization is a systems engineering covers a very wide, when optimize the database should be
applications, I/O subsystem and the operating system as the main object of optimization. From the database of system structure, software structure, schema objects as well as the specific business and technical implementation, carries on the overall consideration. They firstly introduce the database optimization techniques with its application on the large-scale Oracle structure. Parallel execution makes the certain function of the database by multiple server process to be processed simultaneously. These capabilities include create indexes, loading data and restore the database, etc. Using parallel mechanism in the process of database query will greatly improve the query speed, reduce the waiting time.

Later, they analyze the enterprise resource management system and evaluation model, in practice, the role of performance indicators with a baton that kind of performance indicators, means something important, people will efforts in the direction of the indicators to measure and not measure what people will ignore anything. Combining the database technique, they optimize the traditional ERP system.

In the paper “An Optimum Source Coverage Adaptive Gateway Discovery for Heterogeneous Networks”, a Mobile ad hoc network (MANET) is a standalone network in which the communication of mobile nodes (MNs) is restricted within its own premises. To enhance the communication range of mobile nodes, MANET is connected to the Internet using Internet Gateways (IGs). Since IG is used to integrate MANET with the Internet, efficient selection of IG is important for mobile nodes to discover the routes to the IG. This paper aims to develop an adaptive IG discovery approach that dynamically modifies the proactive area. The proposed scheme considers the average number of hop count and standard deviation of hop count of all the Active Sources (ASs) which desire Internet connectivity.

The study “Design and Implementation of a Lightweight Electronic Village System Based on REST Web Service” states that electronic village system is becoming increasingly essential because of the significance of helping rural informatization and narrowing digital divide between rural area and urban area. However, traditional electronic village systems cannot meet the demand of rural area nowadays. This paper proposes a well flexible, scalable and maintainable lightweight electronic village system that is adequate for practical use based on REST web service. The proposed system not only satisfies the functional requirements of publics in rural area, but also has good architectural characteristics and adaptability to rapid changing informatization demand, compared with other electronic village systems. Moreover, the proposed system is able to allow systems of higher-level government to access service by CORS, and it supports multiple types of clients, including PC and mobiles. The electronic village system will come into use in Minxing Village located in Guangzhou City soon.

In the study “Fuzzy Based Adaptive User-Weight Classification Scheme for EDCA in IEEE 802.11e WLAN”, in IEEE 802.11e Wireless Local Area Network (WLAN), the existing user-differentiation technique used in Enhanced Distributed Channel Access (EDCA) protocol is affected by the collision rate and battery capacity of the mobile stations. To solve this issue, a Fuzzy based user-weight classification scheme for EDCA in IEEE 802.11e WLAN is proposed. In this scheme, the inter-node priority for each traffic class is assigned to each mobile station. To estimate the inter-node priority, fuzzy logic is applied considering the traffic access category, number of transmitted packets, collision rate and residual energy level parameters for each traffic class. Based on the outcome of the fuzzy rules, inter-node priority is determined and the node weights are updated dynamically.

In the paper “A Localization Algorithm Considering Node Movement for Wireless Sensor Network”, for the application of wireless sensor networks, the perceptive information
without location information is meaningless. With the popularity of mobile devices, the mobile node localization problem is attracting more and more researches. This paper, they proposed a localization algorithm. The proposed algorithm minimizes the range of sampling node by using the node’s movement trajectory. This improves the efficiency of sampling and the positioning accuracy.

Paper “Virtual Host Network Traffic Scheduling Based on Composite Particle Swarm Optimization”, aiming at solving the problems of unbalanced cloud data center virtual host network link bandwidth utilization and multi QoS (Quality of Service) security issues in different services, in this paper, a multi QoS based network traffic scheduling model for virtual machines is proposed. In order to achieve the global optimal network traffic scheduling, the model uses Shannon information entropy to measure the network link traffic balance and uses the linear weighted sum method to transform the multi objective optimization into a single objective problem. At the same time, they put forward a network traffic scheduling algorithm based on particle swarm composite. By dividing the original solution space into several equivalent subspaces, each particle swarm is independently searched in the subspace. Therefore, the algorithm has a faster convergence rate and avoids falling into the local optimal value problem easily caused by the traditional algorithm.

In the study “Analysis of Hardware Architecture Markovian Chain Queuing Model for Wireless Sensor Networks”, a wireless Sensor Network (WSN) commonly consumes fairly less energy whereas light and multiple-distributed sensors along with an appropriate wireless network usually come with a lower data rate. An increased system performance along with relatively a higher stability can be achieved by means of applying suitable routing protocol and QoS. QoS represents the effectiveness and robustness of any system concerned. The expansion in relation to productivity of a system may depend on keeping the energy consumption at a controlled level. This paper reports on a study in which quality measurement service was provided by means of analyzing packets in the queuing systems by employing queuing theory. The proposed model is two M/M/1/N queues in tandem with N buffer capacity.

In the article “Study of Network Size Measurement Algorithm for P2P System”, peer-to-peer (P2P) networks have recently gained much attention owing to their self-organization characters under dynamic and decentralized environment. It is important for a P2P routing to keep track of the underlying network topology or at least an estimation of the number of nodes in such a network. However, this is quite difficult due to the frequent arrival and leave of nodes in peer-to-peer networks. In order to solve this problem, two network size measurement algorithms are proposed: binary tree and range searching to suit the network fluctuate. The advantages and disadvantages of the two size measurement algorithms are discussed.

Authors of the paper “Design of Intelligent Urban Bus System Based on ZigBee Technology”, proposed an intelligent urban bus system based on ZigBee3.0 technology after researching conditions of resent bus systems. This system includes the solution of moving-bus positioning, the auto-announce function and design of intelligent bus stop board. Contrasted with resent bus systems, this system has the virtue of low construction cost, low running cost, low implementation difficulty and high intelligent level. ZigBee3.0 protocol is compatible with wifi. Without additional ZigBee chip in smart phones, the intelligent bus system based on ZigBee3.0 can interconnect with smart phones directly. It will break the barrier between citizens and intelligent bus system, and the real intelligence can be realized.
In the paper “Performance Comparison of Different Affine Projection Algorithms for Noise Minimization from Speech Signals”, different variants of affine projection algorithms (APAs) are implemented for noise minimization from speech signals. The variants of APA implemented are R-APA, VSS-RAPA and R-APSA. The performances of these algorithms are compared for various parameters like SNR improvement, mean square error (MSE), convergence rate, robustness and computational complexity. Results are computed on mathematical simulation of noise cancellation system on Matlab. Noisy speech samples corrupted by F16, babble16, car and factory noises at 0dB, -5dB, -10dB and -20dB SNR levels for both single word and sentence are used for simulation at different filter orders. It is observed that the R-APSA algorithm outperforms among all algorithms at all filter orders and all input SNR levels. The R-APSA algorithm shows a maximum of 21.2 dB of improvement in SNR at -20dB input SNR level at filter order 5.

In the paper “Design and Research on the Special System Architecture for Peer-to-Peer Distributed Storage System Based on Node Grouping”, the organization pattern of P2P (Peer-to-Peer), has become an important form of internet application of new generation because of its such features, as good expansibility, fault tolerance and high-performance. The persistent data storage is the key to inhibiting the development of global storage system, and is also difficulty issues of the research. This paper describes a design idea and a system architecture of distributed storage system established on P2P in detail, and proposes an effective mechanism according to resource topic and predicted network distance for node grouping, and verifies the persistent data storage performance of P2P global storage system.

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