2013 International Conference on Advanced Technologies for Communications

(ATC 2013)

Ho Chi Minh, Vietnam
16 – 18 October 2013

Registration

08:30 - 09:00

Opening Ceremony

09:30 - 10:30

Keynote Speech 1

Dependable BAN of Things for Medicine, Disaster, Cars and City
Professor Ryuji Kohno
Chair: Matthias Pätzold (University of Agder, Norway)

Wireless body area network (BAN) has been researched and developed for ubiquitous and remote medicine and its international standard IEEE 802.15.6 was established in February, 2012. Highly reliable and secure, i.e., dependable BAN can be applicable to a body of cars, buildings as well as a human body for dependable machine-to-machine (M2M) sensing and controlling. Such a M2M network can be called as "BAN of Things" like Internet of Things (IoT). To perform dependability of BAN, cross-layer and multi-layer of technologies must be jointly optimized. This keynote introduces such theories and technolgies as well as major applications with their global trend.

10:30 - 11:00

Coffee Break

11:00 - 12:00

Keynote Speech 2

Wearables and the Future of Computing
Sonny X. Vu: CEO, Founder of Misfit Wearables
Chair: Huu Tue Huynh (International University, HCMC VNU, Vietnam)

- Wearables - what they are and why they're going to be important
- A new design approach to product development
- Why Misfit is doing all this work in Vietnam
- Advantages and challenges for doing R&D in Vietnam

12:00 - 13:30

Lunch Break

13:30 - 15:30

C1: Communications 1

Cognitive Radio
Room: Hue
Chair: Vo Nguyen Quoc Bao (Posts and Telecommunications Institute of Technology, Vietnam)

13:30 *Cognitive MIMO AF Relay Network with TAS/MRC Under Peak Interference Power Constraint*

Thi My Chinh Chu (Blekinge Institute of Technology, Sweden); Hoc Phan (Blekinge Institute of Technology, Sweden); Hans-Juergen Zepernick (Blekinge Institute of Technology, Sweden)

In this paper, we study the use of transmit antenna selection (TAS) and maximal ratio combining (MRC) for a cognitive multiple-input multiple-output (MIMO) amplify-and-forward (AF) relay network. We focus on the scenario that each of the source and relay selects only a single antenna which maximizes the instantaneous signal-to-noise ratio (SNR) to transmit and forward the signal while the receiver combines the signals from all receive antennas. Utilizing TAS, the considered cognitive network not only offers advantages such as achieving full diversity order with low transmit complexity but also reduces the interference induced to the primary transmission as compared to maximum ratio transmission (MRT). This in turn becomes benifical for the secondary network when this network operates under the interference power constraint of the primary receiver. In particular, we derive expressions for the outage probability and symbol error rate (SER) of the considered network to evaluate the system performance. We also develop an asymptotic analysis for the outage probability and the SER to obtain diversity and coding gain. With the tractable asymptotic expressions, the effect of network parameters such as the number of antennas, the transmission distances, and the interference power constraint of the primary receiver on the system performance are readily revealed.

pp. 1-6

13:50 *Power Optimization for Multiuser MISO-OFDMA Based Cognitive Radio Systems*

Nguyen Hoa (Hanoi University of Science and Technology, Vietnam); Thanh Hieu Nguyen (Nanyang Technological University, Singapore); Van Duc Nguyen (Hanoi University of Technology, Vietnam); Truong Vu Bang Giang (VNU University of Engineering and Technology, Vietnam)

This paper proposes analysis power optimization for MISO-OFDMA downlink based cognitive radio system that maximizes the sum rate of multi secondary users (SU). The problem is solved based on dual optimization method under constraints on the tolerable interference thresholds between secondary users and primary user's (PU) frequency bands and the total transmission power. In proposed system, multiple transmit antennas cooperatively design their respective transmit beamforming vectors (MISO) to optimize the system performance. Accordingly, this MISO technique has been applied to OFDMA Cognitive system to compensate for the impact of from PU to CR. The simulation results are presented showing how CR coordinator determine the position and power which are assigned to each CR subcarrier to maximize the transmission throughput and

the suggested MISO system has more more enhanced and efficient total throughput then previous SISO system.

pp. 7-11

14:10 *On the Performance of Cognitive Radio Networks with DF Relay Assistance Under Primary Outage Constraint Using SC and MRC*

Charles Kabiri (Blekinge Institute of Technology, Sweden); Hans-Juergen Zepernick (Blekinge Institute of Technology, Sweden); Louis Sibomana (Blekinge Institute of Technology, Sweden); Hung Tran (National Institute of Education Management, Vietnam)

In this paper, we analyze the performance of a cognitive radio network (CRN) that is assisted by a single relay. In particular, the secondary user (SU) transmitter (SU-Tx) and the secondary relay (SR) utilize the licensed frequency band of the primary user (PU). To protect the PU from harmful interference, the SU-Tx and SR must regulate their transmit power to satisfy the outage probability constraint of the PU. System performance in terms of outage probability is analyzed for selection combining (SC) and maximal ratio combining (MRC). Specifically, a power allocation policy and analytical expressions for the outage probability with SC and MRC are derived. Our results show that the upper bound of the outage probability corresponding to MRC is equal to the exact expression for the outage probability for SC.

pp. 12-17

14:30 *Cognitive Underlay Communications with Imperfect CSI: Network Design and Performance Analysis*

Giang Nguyen (Posts and Telecommunications Institute of Technology, Vietnam); Vo Nguyen Quoc Bao (Posts and Telecommunications Institute of Technology, Vietnam); Hung Nguyen-Le (The University of Danang & University of Science and Technology, Vietnam)

This paper is concerned with performance analysis of cognitive underlay partial relay networks with imperfect channel state information (CSI). To assure the required quality of service (QoS) at primary receivers, transmit power at secondary nodes is adjusted by using a back-off power scheme under imperfect CSI condition. The back-off power strategy reduces transmit power at secondary nodes and in turn degrades the secondary network performance. Under the performance tradeoff between primary and secondary networks, this paper considers the use of multiple antennas at destination node and partial relay selection to enhance the secondary network performance without sacrificing the performance of the primary network. To justify the benefit of using the network design, several analytical and simulated results of the network performance are provided under various system settings.

pp. 18-22

14:50 *On the Performance of Cognitive Underlay Alamouti Space-Time Coding Schemes*

Nguyen Van Chinh (Posts and Telecommunications Institute of Technology, Vietnam); Vo Nguyen Quoc Bao (Posts and Telecommunications Institute of Technology, Vietnam); Nguyen Luong Nhat (Posts and Telecommunications Institute of Technology, Vietnam)

In this paper, we study the performance of underlay Alamouti schemes over Rayleigh fading channels. In particular, the closed form expressions of outage probability and Shannon capacity are derived. We develop a new derivation approach, which allows to obtain the exact form of Shannon capacity, where two interference links to the primary receiver are taken into account. Monte Carlo simulations are performed to verify the correctness of the analysis results. The numerical results show that the system achieves full diversity and outperform underlay direct transmissions.
pp. 23-27

15:10 *Time-Selective Channel Estimation in Two-Way Multi-relay MIMO-OFDM Transmissions*

Thuy Tran-Thi-Thu (The University of Danang, Vietnam); Dung Tran-Van (The University of Danang, Vietnam); Hung Nguyen-Le (The University of Danang & University of Science and Technology, Vietnam)

This paper is concerned with doubly selective channel estimation for two-way multi-relay orthogonal frequency division multiplexing (OFDM) transmissions with multiple-input multiple-output (MIMO) configurations. Over time-varying cascaded fading channels among moving nodes, basis expansion models (BEMs) are deployed as fitting parametric models to reduce the number of channel parameters to be estimated. Using maximum likelihood (ML) estimation principle, BEM coefficients are first estimated then time-varying cascaded channel responses are determined by replacing the estimated BEM coefficient values into the used BEM expression. Simulation results are provided to verify the performance of the proposed estimation algorithm under different system scenarios.
pp. 28-32

N1: Network 1

Room: Saigon
Chair: Nguyen Huu Thanh (Hanoi University of Science and Technology, Vietnam)
13:30 *Buffer-based bitrate adaptation for adaptive HTTP streaming*

Hung Le (University of Aizu, Japan); Nguyen V. Duc (Aizu, Japan); Pham Ngoc Nam (HUST, Vietnam); Anh T. Pham (The University of Aizu, Japan); Truong Cong Thang (The University of Aizu, Japan)

Live and on-demand video streaming has become a significant part of the Internet traffic. In order to guarantee the best user experience, the multimedia service is required to support large fluctuation in different bandwidth conditions. One of the cost effective means for multimedia delivery nowadays is MPEG HTTP standard. The key challenge of this technology is how to adaptive change video bitrates according to network variation and client buffer while bestowing upon users the best possible video quality. In this paper, we propose a new the rate-adaptation algorithm on client side which aims to balance the need for video smoothness and buffer stability. The experiment shows that our solution is more flexible as well as can estimate the buffer in the future.
pp. 33-38

13:50 *A Highly Reliable Link Scheduling Strategy for WirelessHART Networks*

Sheng Zhang (Tsinghua university, P.R. China); Guoyong Zhang (Tsinghua University, P.R. China); Ao Yan (Tsinghua University, P.R. China); Zhongsheng Xiang (Tsinghua University, P.R. China); Tianming Ma (Tsinghua University, P.R. China)

WirelessHART is a kind of wireless mesh network communication standard specially designed for industrial process automation applications and FHSS as well as TDMA mechanism guarantees its robustness. In this paper, time slots and channels are allocated for each link in WirelessHART networks by edge-coloring, and a graph route-based link scheduling algorithm with collision avoidance is proposed. By combining the optimal routing algorithm with the multi-hop retransmission mechanism, the performance of WirelessHART networks is effectively improved. The analysis shows that the proposed scheduling strategy has a higher reliability and a lower latency than previous scheduling algorithms, which meets the requirements of the real-time communication in WirelessHART networks.

pp. 39-43

14:10 *QoS-aware Cross-layer Mechanism for Multiple Instances RPL*

Thanh Long Nguyen (Vrije Universiteit Brussel, Belgium); Marie Paule Uwase (Vrije Universiteit Brussel, Belgium); Jacques Tiberghien (Vrije Universiteit Brussel, Belgium); Kris Steenhaut (Vrije Universiteit Brussel, Belgium)

In Low power and Lossy Networks (LNNs), routing has been considered as a main design and development challenge. This has led to the open design of the IPv6 routing protocol for LLNs called RPL. The protocol allows creating groups (instances) of multiple loop-free routing topologies over a physical network. The purpose of forming an optimized tree routing topology is to drive packets from the nodes to the collection point or sink which is the root of the tree. In this paper, we take advantage of extracting routing information to support high performance transmission of priority packets by proposing a QoS-aware cross-layer mechanism. The mechanism is explained and its performance is evaluated through simulation experiments. Simulation results show that the proposed mechanism provides high Packet Reception Ratio with low Packet Delivery Latency for priority traffic.

pp. 44-49

14:30 *Network Utility Maximisation: a DC programming approach for Sigmoidal utility function*

Hoai An Le Thi (University of Lorraine, France); Dinh Tao Pham (Laboratory of Modelling, Optimization and Operations Research, France)

Network Utility Maximisation for nonconcave utility functions is a challenging problem in Communication Systems. We propose an innovative approach in nonconvex programming framework for the Network Sigmoidal Utility Maximisation which has many applications, in particular in Multimedia and Internet congestion control. Our method is based on DC (Difference of Convex functions) programming and DCA (DC Algorithms) which have been successfully applied to many large-scale (smooth or nonsmooth) nonconvex programs in various areas. A simple DC formulation is proposed that leads to a

fast and scalable DCA based algorithm. A distributed version of DCA is developed and some numerical examples are considered. Our algorithm given a global optimal solution in all cases.

pp. 50-54

14:50 *A Comparison of Large-scale Selective Switch-based Optical Cross-connects*

Hai Chau Le (Nagoya University, Japan); Hiroshi Hasegawa (Nagoya University, Japan); Ken-Ichi Sato (School of Engineering - Nagoya University, Japan)

We compare the performance of three notable selective switches-based large-scale ROADM/OXC architectures that can make the best use of existing optical switch technologies for realizing bandwidth-abundant optical networks. We then analyze the tradeoff between node routing flexibility and hardware scale requirement in the selective switches-based ROADM/OXC networks. The impact of WSS/WBSS degree on the network performance and the efficient WBSS cost bound are also evaluated.

pp. 55-59

15:10 *Improving the Performance of Multipath Congestion Control over Wireless Networks*

Tuan Anh Le (Thudaumot University, Vietnam)

Recently, portable devices with wireless network interfaces are becoming more popular than desktop PCs. While multipath coupled congestion control with "linked increases" algorithm (MPTCP-LIA) and its advanced "opportunistic linked increases" algorithm (MPTCP-OLIA) were designed for wired networks. As a result, their performance will be degraded significantly in wireless environments, where packet losses often are caused by random error rather than by network congestion as in wired networks. In this work, we analyze and evaluate several existing multipath congestion control algorithms, and then propose a design of multipath TCP Veno (MPVeno) for wireless networks. Our simulation results show that MPVeno can achieve better goodput than MPTCP-OLIA over wireless links, and guarantee fair bandwidth competition with single-path conventional TCP Veno and MPTCP-OLIA in wired networks.

pp. 60-65

13:30 - 14:30

P1: Poster 1

Biomedical Engineering & Networks
Room: Lobby
Chair: Tuan-Duc Nguyen (International University, HCMC VNU, Vietnam)
Enhancement of CT Image Using Image Fusion

Thanh-An Vu (University of Technical Education of Ho Chi Minh City Vietnam, Vietnam); Hai Thanh Nguyen (International University, Vietnam)

This paper represents a new method for enhancing Computer Tomography (CT) image. In this proposed method, a entropy-based algorithm was applied to detach significant values in the original CT image to produce a detached image. In addition, a decomposition wavelet was employed for both the original CT image

and the detached image to create image fusion. An enhanced image with tumor region was obtained for diagnosis using an inverse wavelet transform. The result is that the tumor region in the enhanced image shows more brilliant points than that in the original image. This result can allow physicians diagnose and predict tumor regions in the CT image

pp. 574-579

Thuong Le-Tien (Hochiminh city University of Technology, Vietnam); Thong Nguyen (Hochiminh city University of Technology, Vietnam); Pham Chi Hieu (HCMUT, Vietnam); Vuong Duc Thang (INSTATECH, Vietnam); Nguyen Xuan Phuc (Universitaesmedizin Mannheim, Vietnam)

The issue of locating cephalometric landmarks in skull radiography is necessary for orthodontic treatment, study of skeletal changes, staggered teeth diagnosis, etc. Currently, the steps to identify cephalometric landmarks are primarily based on experiences and the visual assessment of trained doctors. This paper proposes a technique which automatically identifies these landmarks on skull radiography using Histogram of Oriented Gradients (HOG) descriptor. At first, a set of photo is created to classify the regions containing desired benchmarks with other regions. These images will be performed by the HOG descriptor. Then the Support Vector Machine (SVM) algorithm will classify these images and create a reference model. Through this model, we have experimented on several skull radiographies of man at the age from 10 to 32 and women from 10 to 35. The result completely convinces as not only detects cephalometric landmarks on the sharpness of the images but also on the blurred images.

pp. 580-585

Thanh Huong Nguyen (Grenoble Institute of Technology, France); Thi Hue Nguyen (MICA, HUST, France); Thi-Lan Le (MICA, HUST, Vietnam); Thi-Thanh-Hai Tran (Hanoi University of Science and Technology, Vietnam); Nicolas Vuillerme (University of Grenoble, France); Tan Phu Vuong (Grenoble INP, France)

People with low and lost vision are increasingly independent nowadays; besides, more and more resources and facilities have been developed to enable them adapt to daily life in an active way. Based on the idea of sensory substitution and the electrotactile stimulation on the tongue, a wireless device was studied and designed in order to aid the visually-impaired people in getting more perception of their surrounding environment. The device was also fabricated and tested with normal people to understand the sensibility of human tongue in achieving the information from the device. With wireless part, the device is totally able to communicate with the host system and receive the command to help users perceive and direct in the environment.

pp. 586-591

Vo Viet Minh Nhat (Hue University, Vietnam)

Scheduling is one of the activities which have a great impact on the communication performance of optical burst switching networks. There have been many scheduling algorithms proposed but most of them are online. Recently, several algorithms of group scheduling have been published, but they have the complexity of NP-complete. Moreover, the timeslot of group scheduling is predetermined and fixed without considering the dependence on the rate of arriving data. This article proposes a new algorithm of group scheduling which has the linear complexity and has the timeslot of group scheduling that could be changeable and adapt to the rate of arriving data. The analyses and evaluations of the effectiveness based on the simulation results will confirm the advantages of our algorithm.
pp. 592-596

Detecting Phishing Web sites: A Heuristic URL-Based Approach

Luong Anh Tuan Nguyen (HCM City University of Transport, Vietnam); To Ba Lam (HCM City University of Transport, Vietnam); Huu Khuong Nguyen (HCM City University of Transport, Vietnam); Hoang Minh Nguyen (University Economics and Law, VNU-HCM, Vietnam)

With the growth of internet, e-commerce plays a vital role in the society. As a result, phishing, the act of stealing personal user data used in e-commerce transaction, has been becoming an emergency problem in modern society. Many techniques have been proposed to protect online users, e.g. blacklist, page ranking. However, the numbers of victims have been increasing due to inefficient protection technique. This is due to the fact that phishers try to make the URL of phishing sites look similar to original sites. In this paper, we are interested in proposing a new approach to detect phishing site by using the features of URL. Particularly, we derive different components from URL and compute an metric for each component. Then, the page ranking will be combined with the achieved metrics to decide whether the websites are phishing websites. The proposed phishing detection technique was evaluated with the data set of contains 9,661 phishing websites and 1,000 legitimate websites. The results show that our proposed technique can detect over 97% phishing websites.
pp. 597-602

Energy Efficient Delay-aware Routing in Multi-tier Architecture for Wireless Sensor Networks

Trong Thua Huynh (Posts and Telecoms Institute of Technology, Vietnam); Anh-Vu Dinh-Duc (University of Information Technology, Vietnam); Cong Hung Tran (Posts and Telecoms Institute of Technology, Vietnam)

Wireless sensor network (WSN) is composed of a large number of sensor nodes densely deployed in inhospitable physical environments. Due to limitations of sensor nodes in terms of memory, energy and computational capacities, the most important issue for designing sensor network protocols is energy efficiency. Although energy efficiency is a major concern in WSNs, it often suffers from the addition network delay. In this work, we first propose an energy and delay efficient hierarchical clustering scheme called BHC (Binary Hierarchical Clustering) for WSNs. It allows data transmission from sensor nodes to the base station (BS) in the form of multi-hop, multi-path and ensure energy efficiency and

reasonable delay. Next, we provide data distribution algorithms from the sensor nodes to BS as quickly as possible and the most energy efficient. To evaluate the appropriateness of our proposal, we analyze the simulation results against another protocol in terms of communication overhead, total amount of energy dissipated in system and network delay using ns-2 network simulator.
pp. 603-608

Integration of Atheros Ath5k Device Driver in Wireless Ad-hoc Router

Minh Son Nguyen (International University at HoChiMinh, Vietnam)
Research in Mobile ad-hoc networks (MANETs) has been in-progress towards real-time implementation, such as routing protocols, and device drivers for wireless cards. This paper presents and discusses a real architecture of mobile wireless ad-hoc routers on open-source Linux platform. An exploration of Atheros ath5k driver for wireless ad-hoc routers is shown in three- fold. Firstly, operations of WLAN MAC layer (IEEE 802.11), both in the infrastructure mode and the infrastructure-less (ad-hoc) mode, are described and analyzed. Secondly, the source code of ath5k device driver is analyzed and discussed on different characteristics. These ones include: i) data structures to be used in the ath5k, ii) reception and transmission packet flows, iii) configuration flow. Finally, realistic scenarios are presented to illustrate for the operations of ath5k device driver, and to collect statistical wireless information.
pp. 609-613

13:30 - 15:50

T1: Tutorial 1

Mobile Radio Channel Modelling: Modelling, Analysis, and Simulation
Prof. Dr.-Ing. habil. M. Pätzol
Room: Hanoi
This tutorial provides a comprehensive overview of the modelling, analysis, and simulation of mobile radio channels. It offers a detailed understanding of fundamental issues and examines state-of-the-art techniques in mobile radio channel modelling. Important classes of mobile fading channels will be presented, including terrestrial and satellite channels, various types of wideband channels, advanced multiple-input multiple-output (MIMO) channels, mobile-to-mobile channels, vehicle-to-vehicle channels, and channel models for cooperative communication systems. Among them are the following:

- Introduction and basic principles of mobile radio channel modelling
- Explanation of different methodologies for the modelling of mobile radio channels
- Examination of general channel modelling concepts starting from geometrical models over reference models up to simulation models
- Design of reference and simulation models for mobile radio channels using the sum-of-sinusoids (SOS) and the sum-of-cisoids (SOC) principle
- Discussion of various methods for the modelling of given Doppler, delay, and angular profiles
- Presentation of various classes of narrowband and wideband mobile radio channels

- Elaboration on the modelling and simulation of space-time-frequency MIMO channels
- Description of mobile-to-mobile and vehicle-to-vehicle MIMO channels
- Exploration of mobile radio channels for cooperative networks, including double Rayleigh and double Rice channels
- Outlining methods for the design of measurement-based channel models
- Providing an overview of standardized channel models.

15:30 - 15:50

Coffee Break

Rooms: Lobby, Hue, Saigon

15:50 - 17:30

M1: Microwave & Antennas 1

Room: Hue
Chair: Hisashi Morishita (National Defense Academy, Japan)
15:50 *Calculation of Stored Electromagnetic Powers and Q Factors of Very Small Normal-Mode Helical Antennas*

Katsuya Mouri (NDA, Japan); Naobumi Michishita (National Defense Academy, Japan); Yoshihide Yamada (National Defense Academy, Japan); Nguyen Quoc Dinh (Le Quy Don Technical University, Vietnam)
Theoretical explanations of radiated, dissipated and stored energies of small antennas were shown in a textbook. However, practical values of these energies were not discussed previously. In this paper, these energies are obtained numerically through electromagnetic simulations. As for a study object, a normal-mode helical antenna is utilized, because stored electric and magnetic energies are simultaneously observed. First of all, it is shown that these two energies have the same value at the self-resonant conditions. Next, electric and magnetic stored powers are calculated from these energies and are compared with the input power. Moreover, antenna Q factors are also obtained. Adequateness of calculated results is ensured thorough comparing with other calculated results.
pp. 66-69
16:10 *Fundamental Characteristics of a Combined Folded Dipole Antenna with a Feed Line*

Noriyuki Kagiyama (National Defense Academy, Japan); Yusuke Saita (National Defense Academy, Japan); Tsutomu Ito (National Defense Academy, Japan); Hisashi Morishita (National Defense Academy, Japan)
As a fundamental study of a broadband or multi-resonance antenna, we have studied a folded dipole antenna (FDA) and a combined folded dipole antenna (CFDA-1). Now, a new model of CFDA (CFDA-2) is designed. First, we analyze the characteristics of the antennas. Next, we compare the characteristics between the antennas. It is founded that two types of CFDA have similar characteristics.
pp. 70-73

16:30 *Two element ultra low profile inverted L antennas on finite conducting plate for MIMO applications*

Erfan Rohadi (Graduate School of Engineering, Nagasaki University & The State Polytechnic of Malang, Japan); Mitsuo Taguchi (Nagasaki University, Japan)
As the multiple input multiple output (MIMO) antenna system, two ultra low profile inverted L antennas are located on the rectangular conducting plane is proposed and numerically analyzed. The directive gain of 4.12 dBi and the return loss bandwidth of 3.27% are achieved when the size of conducting plane is 0.45 wavelength by 0.45 wavelength. The results show the weak mutual coupling of the proposed antenna and its characteristics are promising as MIMO antenna application.
pp. 74-77

16:50 *Eigenmode Decoupling Technique Exploiting Symmetric Antenna Arrangement*

Kentaro Murata (Iwate University, Japan); Naoki Honma (Iwate University, Japan)
In this paper a novel decoupling method using eigenmode derived from S-parameter is proposed. Eigen beam forming toward a degenerated eigenmode of a mutual coupling channel allows one antenna group to be isolated from the other spatially, which results in decoupling over a wide range of frequencies. Moreover, due to symmetric antenna arrangement, the proposed method can isolate one antenna group from many more antennas in multi-groups.
pp. 78-81

17:10 *Experimental Performance Evaluation of MIMO Sensor with Compact Antenna Arrangement*

Naoki Honma (Iwate University, Japan); Kentaro Nishimori (Niigata University, Japan); Hiroaki Sato (Iwate University, Japan); Yoshitaka Tsunekawa (Iwate University, Japan)
This paper presents the experimental evaluation results of antenna arrangement method for 2x2 MIMO sensor. In the proposed arrangement, all of the transmitting and receiving antennas are located closely. The measurement campaign of MIMO channel in the indoor environment is carried out. The intrusion detection performance with the various antenna arrangements are evaluated for the human positions all over the room. It is found that the proposed antenna arrangement achieves the compact configuration of the sensor antenna system as well as high detection performance.
pp. 82-84

15:50 - 16:50

P2: Poster 2

Communications
Room: Lobby
Chair: Tran Trung Duy (Posts and Telecommunications Institute of Technology, Vietnam)
A Class of Structured Quasi-Cyclic LDPC Codes Based on Planar Difference Families

Shady Abdel raheem (Mansoura Egypt & Telecom egypt, Egypt)
Toward the construction of structured regular quasi-cyclic low-density parity check (QCLDPC) codes of various lengths and moderate to high rates, this paper is devoted to introduce a special classes of (QC-LDPC) with very restricted code parameters based on planar difference families. Such difference families could be obtained by numerical analysis and computer programs. The resulting codes have parity check matrices with column-weight greater than three, at least no 4-cycle and approximately full rank. It can be noted that the construction based on planar difference families exhibits more flexibility than that is based on difference sets in terms of length and code rate selections. Besides, the more increasing in the column weights of parity check matrices of QC-LDPC codes, the more improvement in the minimum distances of them. Simulation results show that over the additive white Gaussian noise channel, these codes could outperform their randomly constructed counterparts.
pp. 614-619

Grouped Transmit Point Selection and Reporting for Coordinated Multi-Point Transmission

Bingyang Wu (Southeast University, P.R. China); Cailuan Su (Southeast University, Vietnam)
Coordinated multi-point (CoMP) transmission of distributed antenna systems is efficient in performance improvement for wireless communications, and it has been considered in the specifications of LTE-Advanced. Base station (BS) or transmit point (TP) selection is necessary and important for a system with a large number of BSs or TPs. A grouped TP selection and reporting scheme is proposed and investigated in this paper. The performance of the scheme, as regards to average capacity and edge user capacity, and the cost of implementation are studied, and it is compared with the optimum scheme and two other schemes. The grouped scheme, compared to the optimum TP selection exhibits a good performance but with a low feedback burden.
pp. 620-624

Investigating Performance of Radio over Fiber Communication System using different silica-doped materials and EDFA and Coherent Receiver

Tuan Nguyen Van (Da Nang University, Vietnam); Vu Le (Danang University of Science and Technology (DUT), Vietnam); Khoa Ho (Danang University of Science and Technology (DUT), Vietnam)
In this paper, we reference the idea of work[1] to investigate more complicated system where EDFA amplifier and Coherent receiver are used to enhance signal quality. Calculating model of RoF transport system using direct modulation technique at transmitter, EDFA and Coherent receiver is proposed. We calculate and determine BER and SNR of the NRZ system using many kinds of different silica-doped materials of optic fiber. We then build algorithm chart to find out system esscential parameters such as EDFA's Gain, EDFA's position for enhancing SNR and reducing BER at the end of system corresponding to different lengths (from 100 km to 180 km). Next, we write and make MatLab-based program run to draw graphs that show system performance such as BER, SNR

versus fiber link length with different silica-doped materials. The results could be used effectively in calculating, designing and operating the RoF systems
pp. 625-630

Analytic Performance Evaluation of Underlay Relay Cognitive Networks with Channel Estimation Errors

Khuong Ho-Van (HoChiMinh City University of Technology, Vietnam); Paschalis C. Sofotasios (University of Leeds, United Kingdom); Son Vo Que (HoChiMinh City University of Technology, Vietnam); Tuan Dang Anh (HoChiMinh City University of Technology, Vietnam); Thai Pham Quang (HoChiMinh City University of Technology, Vietnam); Lien Pham Hong (University of Technical Education, Vietnam)

This paper evaluates the bit error rate (BER) performance of underlay relay cognitive networks with decode-and-forward (DF) relays in arbitrary number of hops over Rayleigh fading and with channel estimation errors. In order to facilitate the performance evaluation analytically we derive a novel exact closed-form representation for the corresponding BER which is validated through extensive comparisons with results from Monte-Carlo simulations. The proposed expression involved well known elementary and special functions which render its computational realization rather simple and straightforward. As a result, the need for energy exhaustive and time-consuming computer simulations can be omitted. Numerous results illustrate that the performance of underlay relay cognitive networks is significantly degraded by channel estimation errors and that is highly dependent upon of both the network topology and the number of hops.
pp. 631-636

New expressions of ergodic MIMO channel capacity

Khoa N Le (University of Western Sydney, Australia)

This paper derives new compact capacity expressions of $N \times N$ multiple-input multiple-output (MIMO) independent Rayleigh fading channels with N transmit and N receive antennas. The complex-valued channel parameters are assumed to be identically-distributed, zero-mean, unit-variance and circularly-symmetric Gaussian. A new and straightforward method to compute the individual MIMO channel capacity expressions is given which should improve the efficiency of calculating the ergodic channel capacity in fading environments. Corrections to ergodic multiple-input single-output (MISO) and single-input multiple-output (SIMO) channel capacity expressions available in the literature are given which offer fresh insights into SIMO, MISO and MIMO system capacity computation.
pp. 637-641

Cross layer design to enhance TCP performance in Multi-hop Ad hoc Networks

Pham Thanh Giang (Institute of Information Technology, VAST, Vietnam); Pham Minh Vi (Vietnam Government Information Security Commission, Vietnam)

In this paper, we propose a new cross-layer scheme Cooperation between channel Access control and TCP Rate Adaptation (CATRA) aiming to manage TCP flow contention in multi-hop ad hoc network. In CATRA scheme, we collect useful information from MAC and physical layers to estimate channel utilization of the station. Based on this information, we determine the optimal Contention Window CW size to control station contention. This method can achieve fair channel

access of each station and efficient spatial channel usage. Moreover, the fair value of bandwidth allocation for each flow will be calculated and sent to Transport layer. Then, we determine the optimal sending rate to solve TCP flow contention. By transmitting packets from Transport layer according to this optimal sending rate, the throughput of each flow becomes fairer. The performance of CATRA scheme is examined on various multi-hop network topologies by using Network Simulator (NS-2).
pp. 642-647

Tellurite Nanowire Core Photonic Crystal Fiber

Md. Anwar Hossain (Japan Society for the Promotion of Science (JSPS), University of the Ryukyus & Asian Institute of Technology (AIT), Japan); Yoshinori Namihira (University of the Ryukyus, Japan)
Optical properties of tellurite nanowire core photonic crystal fiber (PCF) are compared with silica and germanium-doped core PCFs. Using finite element method (FEM) with a circular perfectly matched boundary layer (PML), superior peformance of tellurite nanowire core PCF is reported to design highly nonlinear and high numerical aperture (NA) PCF. With the same structural dimension, tellurite nanowire core PCF is found to be 14.5 times higher nonlinear coefficient compared to pure silica core PCF and 7.5 times higher nonlinear coefficient compared to 3% germanium (Ge)-doped core PCF. In addition, tellurite nanowire core PCF shows higher NA compared to pure silica core PCF and 3% Ge-doped core PCF. Moreover, zero-dispersion manipulating techniques of tellurite nanowire core PCF are briefly described with simulation results.
pp. 648-651

15:50 - 17:30

S1: Signal Processing 1

Room: Saigon
Chair: Ha H Kha (University of Technology Sydney, Australia)
15:50 *Blocking Artifacts Reduction of DCT Compressed Image Based on Block Wiener Filtering*

Azusa Ota (Keio University, Japan); Taichi Yoshida (Keio University, Japan); Masaaki Ikehara (Keio University, Japan)
In this paper, a novel de-blocking algorithm is proposed, using block wiener filtering, shift and weighted average operations.The dissipation of block boundary occur by a combination of the shift and average operations [1]. However, visually annoying artifacts are noticeable around the edge region in highly compressed images. In the proposed method, the wiener attenuation coefficients are given based on the estimated error in a block unit. The DCT encoded images have a large margin of error from one block to another. Hence texture information losses are prevented while smoothening effect is applied to the region around the edge. In examples, the proposed algorithm shows better performance than the previous one.
pp. 85-89

16:10 *Coding-reduced digital audio signal by subband coding 4 channels using the new set of decimation ratios [6 6 3 3]*

Nguyen Xuan Truong (The Audio-Video Broadcasting College 1, VOV, Vietnam)

The SBC (subband coding) using the multirate filter bank was proposed in 1980, this coding method splits full audio spectrum into subbands, and assigns more bits to each subband with higher energy. If the power spectral density (PSD) of any subbands is approximately zero, then those subbands need not be assigned any bits at all. While reconstruction, the subband signals are synthesized to the original signal. The most important advantage of SBC is very high reduced data rate, but the acceptable signal quality. Nowadays, all of the SBC applied in audio signal coding use the Wavelet analysis. Its decimation ratios must be the power of 2. That is the shortcoming in the Wavelet analysis. This paper has proposed a new set of decimation ratios. When the SBC uses this set, it decreases data rate, compared to other used sets in condition of the same number of subbands.
pp. 90-94

16:30 *Human Fall Detection Based On Adaptive Background Mixture Model and HMM*

Khue Tra (DUT, Vietnam); Pham Van Tuan (Da Nang University of Technology, Vietnam)

Nowadays, there are many fall detection systems based on intelligent video analysis. However, these systems are still many problems such as lighting changes, long-term scene changes or recognition with low performance... In this paper, Gaussian Mixture Model (GMM) based Stauffer-Grimson algorithm is proposed to segment moving object. An ellipse model has been built to track the motion of the object and five feature was extracted from this ellipse model are recognized by Hidden Markov Model (HMM). The experimental results of our system shows that using GMM in objects segmentation and HMM in the recognition would provide a high accuracy under different conditions.
pp. 95-100

16:50 *A Novel Technique for Geometrically Robust Blind Image Watermarking Extraction*

Tuan Thanh Nguyen (University of New South Wales, Australia); David Taubman (University of New South Wales, Australia); Van Huynh (HoChiMinh City University of Technology, Vietnam); Thuong Le-Tien (Hochiminh city University of Technology, Vietnam)

In this paper, we introduce a novel method for extracting information in blind image watermarking based on Scale Invariant Feature Transform (SIFT) and the even-odd quantization algorithm. Unlike some existing methods using the same strategy of selecting the robust non-overlapped regions in both embedding and extraction processes, which may occur some errors in watermark synchronization, we propose a fast effective algorithm exploiting the correlation among all detected regions to recover the embedded information. As a result, our method is not only applied to verify the presence of the embedded data but also allows to extract information directly without the original message. Moreover, in order to obtain the security, a secret key is used associated with the SIFT factors to distribute the embedded regions randomly. The experimental results show that the

information extraction of our proposed method is implemented successfully and robustly against geometric attacks of rotation, scaling and cropping.
pp. 101-105

17:10 *Fire Detection Based on Video Processing Method*

Nguyen Ti Ti (HCMUT, Vietnam); Nguyen Phuc Thuan (Ho Chi Minh City University of Technology, Vietnam); Tuan Do-Hong (Ho Chi Minh City University of Technology, Vietnam)

Because of huge damage caused by fire, the early fire detection becomes more and more important. With the rapid development of image and video processing, the fire detection technology based on video processing is becoming the focal point of some research due to its advantages of high intuitive, speed and anti-jamming capability. In this paper, we propose a method for early fire detection based on region growing. This method uses colour and motion information extracted from video sequences to detect fire. It can work both indoors and outdoors. Moreover, it detects fire at the beginning of the burning process, enabling an early response than would be possible with a conventional fire detector. The method performs the region growing segmentation to identify colour pixels in the scene and then identify moving pixels based on the ratio of height and width of suspected fire region and correlation coefficient. This method can get low false alarm rate by eliminating the fire-like colours because it just needs a fire pixel as the seed pixel.
pp. 106-110

16:30 - 17:30

E1: Electronics 1

Room: Hanoi
Chair: Xuan-Tu Tran (Vietnam National University, Hanoi, Vietnam)

16:30 *Demonstration of a low cost UWB Transceiver for HD/SD-SDI audio video wireless transmissions*

Richard Thai Singama (Royal Military Academy - Institut Galilée UP13 & CISS - Université Paris 13 LPL Institut Galilée CNRS UMR 7538, France); Frédéric Du-Burck (Université Paris 13 - Institut Galilée, France)

This paper describes a low-cost architecture for uncompressed wireless system for HD/SD-SDI, using UWB technology in the range of 3.1 GHz to 10.6 GHz. It has been broken down into three separate devices the first one being the UWB transmitter, the second one being an antenna coin disc type and the third one being the receiver. An Audio-Video transmission test has been done for a transmission distance of about 5 meters and the result has proved successful. The experimental results comply with the indoor FCC rules.
pp. 111-114

16:50 *A Constraint-based Watermarking Technique Using Schmitt Trigger Insertion at Logic Synthesis Level*

Bao Huynh (The University of Science, Hochiminh City, Vietnam); Thuc Hoang (The University of Science, Hochiminh City & The Faculty of Electronics and

Telecommunications, Vietnam); Bui Trong Tu (University of Science Ho Chi Minh City, Vietnam)

Although the advancement in IP design increases rapidly, it is easy to copy and resell IP cores without noticing its owners. As a consequence, IP Protection (IPP) using watermarking has emerged as the state-of-the-art technique and raises numerous interests from many IC designers. In this paper, we propose a constraints-based watermarking technique to embed a signature in the design in order to prove the copyright of its makers. Our method carefully selects a list of candidate nets for embedding watermark. Then, a bit '1' in the stream of watermarking bits is defined by adding a pairs of improved Schmitt Trigger circuits to the corresponding net. Besides using the ASCII string of the signature, two hash functions, i.e. MD5 and BASE64, are utilized to create a unique stream of watermarked bits. The experimental results show that our proposed method has the ability to preserve the original functionality, performance of the design, and low overhead of the watermarked circuit. Specifically, when the proposed technique is applied into the 720-cell simple CPU IP core, there are 0% and 12% increase in delay and area overhead, respectively. Furthermore, if it is applied into practical circuits with millions cells, the area overhead will be approximately to 0%.
pp. 115-120

17:10 *Ubiquitous Sensor Network for Development of Climate Change Monitoring System Based on Solar Power Supply*

Tien Truong Vo (International University, HCMC VNU, Vietnam); Tuan-Duc Nguyen (International University, HCMC VNU, Vietnam); Minh-Thanh Vo (International University, Vietnam)

This paper presents a framework for wireless sensor networks (WSNs) designed to observe impacts of climate change in crop fields. We propose a system architecture for ubiquitous WSNs for monitoring automatically and continuously in real-time. A prototype system includes two base stations and several sensor nodes which are powered by solar cell are designed and implemented. Climatic parameters from sensor nodes are sent via WSN to the base station, while base station communicates with remote data server center through GPRS network. By using multiple methods of communication, it could enable monitor areas where not in GPRS coverage. With advantages of low-cost and ubiquitous monitoring, the system can be applied widely in agriculture in developing countries like Vietnam.
pp. 121-124

Thursday, October 17

08:00 - 10:00

C2: Communications 2

Cognitive Relay Networks
Room: Hue

Chair: Vo Nguyen Quoc Bao (Posts and Telecommunications Institute of Technology, Vietnam)

08:00 *On the performance of Outage Probability in Underlay Cognitive Radio with Imperfect CSI*

Tu Lam Thanh (Posts and Telecommunications Institute of Technology, Vietnam); Beongku An (Hongik University, Korea); Vo Nguyen Quoc Bao (Posts and Telecommunications Institute of Technology, Vietnam)

In cognitive spectrum sharing systems, interference probability (IP) is one of the most important performance metrics illustrating the interference level at the primary network. In this paper, the interference probability of the primary network due to secondary underlay partial relay selection networks is investigated under the assumption of imperfect channel state information (CSI) of interference links. Numerical results show that it depends not only on the correlation efficient of interference links but also on the transmit power of secondary transmitters. It is also shown that the back-off technique is an efficient approach to guarantee the given quality of service (QoS) of the primary network. For secondary networks, we derive the outage probability over Rayleigh fading channels. Monte-Carlo simulations are performed to verify the correctness of the analysis.

pp. 125-130

08:20 *Multi-hop Transmission with Diversity Combining Techniques Under Interference Constraint*

Tran Trung Duy (Posts and Telecommunications Institute of Technology, Vietnam); Vo Nguyen Quoc Bao (Posts and Telecommunications Institute of Technology, Vietnam)

In this paper, we study performance of multi-hop cooperative transmission protocols in underlay cognitive radio networks. In the considered protocols, relays and destination employ diversity combining techniques such as selection combining (SC) and maximal ratio combining (MRC) to combine the packets received from the secondary source and previous relays. We derive asymptotic closed-form expressions of outage probability over Rayleigh fading channel. Monte Carlo simulations are presented to verify the derivations.

pp. 131-135

08:40 *Noncoherent Decode-and-Forward Cooperative Systems with Maximum Energy Selection*

Ha X. Nguyen (Tan Tao University, Vietnam); Cuu Ho (Sai Gon University, Vietnam); Chan Dai Truyen Thai (IFSTTAR, France); Danh Nguyen (Faculty of Electronics and Telecommunications, University of Science & TMA Solution, Vietnam)

This paper investigates the performance of a maximum energy selection receiver of an adaptive decode-and-forward (DF) relaying scheme for a cooperative wireless system. In particular, a close-form expression for the bit-error-rate (BER) of a system composed of one source, K relays, and one destination and with binary frequency-shift keying (BFSK) modulation is analytically derived. Based on the derived BER, the optimal thresholds used at the relays to address the issue of error propagation are obtained by solving an optimization problem. The approximate thresholds are also investigated and shown that the system achieves a

full diversity order. Both analytical and simulation results are provided to validate our analysis.
pp. 136-140

09:00 *Physical Network Coding for Bidirectional Relay MIMO-SDM System*

Duc Hiep Vu (Le Quy Don Technical University, Vietnam); Van Bien Pham (Le Quy Don Technical University, Vietnam); Nam Xuan Tran (Le Quy Don Technical University, Vietnam)

Physical-layer network coding (PNC) is a promising technique to increase transmission throughput over bidirectional relay wireless networks. In this paper, based on the work by Zhang and Liew, we propose a new scheme called multiple input multiple output spatial division multiplexing PNC (MIMO-SDM-PNC). By using MIMO-SDM, the proposed scheme achieves double multiplexing gain and also does not require that the end nodes know the information about the forward channel from the source nodes to the relay. Compared with the system by Zhang and Liew, the proposed system achieves the same diversity order. The MMSE based detection was shown to have equivalent BER performance with that of the MIMO-PNC while the ZF based suffers about 2.3 dB power loss due to noise amplification problem.
pp. 141-146

09:20 *Multiuser Scheduling in Two-Way Relay Networks*

Vien Nguyen-Duy-Nhat (Danang University of Technology, Vietnam); Hung Nguyen-Le (The University of Danang & University of Science and Technology, Vietnam); Chien Tang-Tan (Danang University of Technology, Vietnam)

This paper studies the problem of multiuser selection in multiple-input multiple-output (MIMO) two-way relay networks. In the literature, existing studies consider multiuser selection for relay networks having homogeneous terminals/users (each is equipped with one antenna). Unlike the existing studies, this paper is concerned with the problem of multiuser scheduling in two-way relay networks using space division multiple access (SDMA) for heterogeneous multiuser transmissions. Numerical simulation results show that using block-diagonalization (BD) precoding and greedy user selection can facilitate heterogeneous multiuser relay transmissions which offer higher system capacity than homogeneous multiuser relay transmissions.
pp. 147-151

09:40 *Effects of Delay Profile of Fading Channels on the Performance of WCDMA*

Paul Fortier (Laval University, Canada); Huu Tue Huynh (Laval University, Canada)

This paper analyzes the effect of an indoor fre- quency selective fading channel, characterized by its power delay profile, on the performance of an asynchronous DS-CDMA system with high transmission rate (50 Mb/s or more). The bit error rate (BER) is determined by the characteristic function method and by Monte-Carlo simulations. The results show that when the rms delay spread is close to the transmitted symbol duration, the system performance degrades considerably and that the performance degradation strongly depends on the maximum delay spread.
pp. 152-157

08:00 - 09:00

P3: Poster 3

Signal Processing
Room: Lobby
Chair: Minh N. T. Nguyen (International University & Vietnam National University - Ho Chi Minh City, Vietnam)

Acoustic Modeling for Under-resourced Languages: A Role in Vietnamese Soccer Video Retrieval

Nhut Pham (University of Science, Vietnam); Quan Vu (University of Science, Vietnam)

Insufficient training data poses a great challenge to acoustic modeling in automatic speech recognition. The problem becomes more severe when presented in the context of under-resourced languages and several specific domains which lack attention from research. This paper explores the role of under-resourced acoustic models in speech-based soccer event retrieval. An event is defined as the spatiotemporal entity interesting to users, which is remarked by the announcer's spoken words. By mining out spoken information from the video, soccer events are detected using a speech recognition system. To resolve the issue of limited training data, subspace Gaussian mixture models are employed. Experimental evaluations are conducted on the first round of World Cup 2010 and the Vietnamese AFF Suzuki-cup 2008 databases. In the best case, transcription performance reaches 74.3% accuracy rate, and an average event detection rate of 60.62% can be obtained.
pp. 652-656

Efficient determination of disparity map from stereo images with a modified Sum of Absolute Differences (SAD) algorithm

Nguyen Tien Dzung (Hanoi University of Science and Technology, Vietnam); Dung Le (Hanoi University of Science and Technology, Vietnam); Hoa Dang Khanh (Hanoi University of Science and Technology, Vietnam)

This paper proposes modification of the conventional Sum of Absolute Differences (SAD) for performance improvement in depth-map estimation from stereo images captured by a camera in a stereo system. The conventional SAD commonly searches in the whole stereo images to find out the difference in pixels between the left and right captured images, and then obtains the corresponding disparity map and this may lead to high elapsing time. In order to reduce the number of searching pixels, the proposed modified SAD tries to estimate the difference only from edge pixels which are referred as pixels-of-interest and bring significant information about depth map. The number of pixels being searched is reduced to about 17% on the total pixels, hence the total elapsing time is saved up to around 89% compared to that of the conventional SAD. This results is promising for implementation of a real-time vision system.
pp. 657-660

A Survey of Classification Accuracy Using Multi-features and Multi-kernels

Hoang Nguyen (Vietnam Television, Vietnam); Thuong Le-Tien (Hochiminh city University of Technology, Vietnam); Tuan Do-Hong (Ho Chi Minh City University of Technology, Vietnam); Cao Bui-Thu (Ho Chi Minh City University of Industry, Vietnam)

The bag-of-words (BoW) model is used widely for image classification. In this model, the image-level representations are designed using BoW frameworks from local low-level features, therefore we introduce our local low-level feature, called the denseSBP feature, using for BoW. We will evaluate performance in classification when using this feature. To increase average precision, we combine denseSBP feature with other features using Multiple Kernel Learning (MKL). In this work, we also propose the method called the integrated method, that it based on using multi-features and multi-kernels in SVM classification to derive the best classification accuracy for each category of a dataset. We perform the comparative analysis about classification accuracies of the method using MKL and the integrated method on image benchmark datasets. The experimental results show comparable classification accuracies of proposal methods with the state-of-the-art methods.
pp. 661-666

A Soft-Processor-Based FPGA Implementation of a Microphone Array Direction-of-Arrival Estimator

Trinh Vo (International University - VNU HCMC, Vietnam); Udo Klein (International University, VNU HCMC, Vietnam)

This paper presents the implementation of a digital system to estimate the direction-of-arrival (DOA) of a sound source signal using the multichannel cross-correlation coefficient (MCCC) method. The implementation is based on a Nios soft processor incorporated in a four-microphone-channel signal processing system on a field-programmable gate array (FPGA). The MCCC algorithm is coded in C and executes on the Nios soft processor on an Altera Cyclone FPGA. The performance of the soft-processor-based FPGA implementation of the MCCC algorithm is investigated by applying simulated microphone input signals from a pre-recorded sound source stored on a secure digital (SD) memory card. The results for noisy and reverberant environments are in good agreement with simulations and they confirm that the DOA estimation robustness is suitable for practical applications.
pp. 667-670

Image Denoising Using Block Classification in Contourlet Domain

Tri Le Quoc Bao (Ho Chi Minh City University of Technology, Vietnam); Tai Nguyen Ngoc (Ho Chi Minh City University of Technology, Vietnam); Vinh Truong Quang (Ho Chi Minh City University of Technology, Vietnam)

This paper presents a new image denoising method using block classification in Contourlet domain. Since the Contourlet subbands contain directional feature of the input image, we apply threholding method to these subbands based on directional information of the input image block. In order to determine effective thresholds, we analyze the impact of thresholding on the Contourlet coefficients with differently directional image blocks. Consequently, a robust thresholding method is applied on input image block based on directional block classification.

As a result, the proposed denoising algorithm achieves better tradeoff between details retain and noises removal. Several experimental results show that the proposed new function is very effective and gives better performance both in terms of PSNR and visual quality.
pp. 671-675

A New Iterative Detection Algorithm for Layered Space-Time Receiver in Frequency Selective Fading MIMO Channels

Fei Yu (Southeast University, P.R. China); He Shiwen (School of Information Science and Engineering, Southeast University, P.R. China); Bateer Li (Southeast University, P.R. China); Yang Luxi (SouthEast University, P.R. China)
The use of multiple antenna systems can increase system capacity in Rayleigh fading environments. The V-BLAST(Vertical Bell Laboratories Layered Space-Time) system which can attain great performance while maintaining low implementation complexity has been paying more attention in recent years. However, the performance of a practical FS-BLAST system with a successive interference cancellation detector suffers great degradation due to the error propagation. In this paper, we propose a novel FS-BLAST detection algorithm which use ML(Maximum Likelihood) searching in iterative detection scheme. From the simulation, we can see that it outperforms the traditional FS-BLAST algorithm.
pp. 676-679

08:00 - 10:00

S2: Signal Processing 2

Room: Saigon
Chair: Tuan Do-Hong (Ho Chi Minh City University of Technology, Vietnam)
08:00 *Development of Real Multi-GNSS Positioning Solutions and Performance Analyses*
Duc Truong (Hanoi University of Science and Technology, Vietnam); Ta Hai Tung (Hanoi University of Science and Technology, Vietnam)
Till recently, for civil users worldwide, GPS was the only Global Navigation Satellite System (GNSS) for positioning purposes. However, the return of GLONASS as well as the appearance of Galileo and Beidou has brought many modern and advanced positioning services to the world. More importantly, the combinations of these systems in common multi-GNSS solutions promise much improvement in accuracy, availability and reliability of the positioning. This paper presents research works on development of multi-GNSS positioning solutions working with real signals collected from the recently launched satellites of the new Galileo and Beidou systems. The result analyses prove not only the readiness of the developed multi-GNSS solutions but also their real advantages over the stand-alone solutions.
pp. 158-163
08:20 *A Real-Time FPGA Implementation of Spectrum Sensing Applying for DVB-T Primary Signal*

Tu T. Nguyen (University of Science, Ho Chi Minh City, Vietnam); Khoa Dang (University of Science, Ho Chi Minh City, Vietnam); Viet Ha Nguyen (HCM University of Science, Vietnam); Nguyen Huu Phuong (HCMUS, Vietnam)
In cognitive radio network (CR), spectrum sensing (SS) plays a very important role. Several local SS schemes have been studied well in the literature to locate spectrum holes for reusing it. However, the sensing's performances almost have not been evaluated fully on hardware structure. In this paper, we focused on FPGA (Field Programmable Gate Array) implementation of spectrum sensing based energy detection for DVB-T (Digital Video Broadcasting - Terrestrial) signal sensing purpose since TV band has been considered for cognitive spectrum secondary access by Federal Communications Commission (FCC). We considered OFDM signal (Orthogonal Frequency Division Multiplexing) in 2k mode - DVB-T as primary signal as specified in draft IEEE 802.22 WRAN standard for reusing the TV band. The system is evaluated and implemented in Stratix II EP2S180. The fixed point 32 bits (fraction: 16.16) is chosen for calculation in FPGA model. The numerical results have shown that the performance of ED based on FPGA platform was matched well with the theory analysis. It was also shown that performance of system was degraded dramatically in Rayleigh fading environment.
pp. 164-169

08:40 *A practical synchronization algorithm for IEEE 802.15.4a UWB receivers*
Tan Nghia Duong (Hanoi University of Science and Technology, Vietnam); Hoang Minh Tu (Viettel, Vietnam); Tran Manh Hoang (Hanoi University of Science and Technology, Vietnam); Quang Hieu Dang (Hanoi University of Science and Technology, Vietnam)
This paper proposes a two-step synchronization algorithm for UWB receivers in accordance with IEEE 802.15.4a standard. A low data rate, low complexity receiver is developed using a typical energy detection UWB non-coherent analog front-end, which consists of a square-law device and an integrate-and-dump ADC with sub-Nyquist sampling rates. A coarse synchronization algorithm, often neglected in literature, is introduced by continuously correlating received samples' segments with a self-generated template until a simple threshold condition is satisfied. A proposed fine synchronization algorithm exploits the low sampling rates of the system and does not need to measure noise power, which help reduce the receiver complexity (and power consumption). Finally, we assess, by simulation, the impact of different sampling rates and the synchronization lengths on bit-error-rate (BER) performance of the system.
pp. 170-175

09:00 *Channel capacity of MIMO OSTBC systems in Nakagami fading environments*
Khoa N Le (University of Western Sydney, Australia)
In recent literature, performance analyses of multiple-input multiple-output (MIMO) multiuser systems using orthogonal space-time block coding (OSTBC) over Nakagami-m fading via bit error rate (BER) estimation have been obtained. In addition, analyses of the average channel capacity of these systems were carried out. From these findings, it was reported that closed-form expressions of the average channel capacity are difficult to obtain because of the presence of a

finite product of an incomplete Gamma function. This paper shows that a new closedform upper bound expression on the average channel capacity for non-integer values of m can be derived which gives insights into performance of OSTBC MIMO systems. The new bound is shown to be tight and valid with sensible numerical results.
pp. 176-179

09:20 *A Scheme of cosine-BOC(n,n) Side peaks Cancellation for Navigation Applications*
Pham Viet Hung (Hanoi University of Science and Technology, Vietnam); Chien Ngoc Dao (Hanoi University of Science and Technology, Vietnam); Nguyen Van Khang (Hanoi University of Science and Technology, Vietnam)
Binary offset carrier (BOC) modulated signals have been introduced in global navigation satellite systems such as Galileo and modernized Global Positioning System. This type of modulation creates multiple side peaks in autocorrelation function. Thus, it causes challenges in the stages of signal acquisition and tracking. In this paper, we present a new method of side peaks cancellation for BOC-modulated signals in order to remove or diminish the side peaks while keeping the sharp and narrow main peak. This proposed method could be applied to cosine-BOC(n,n) modulated signals, which are adopted to Galileo signals. Moreover, this method has better performance in reducing error caused by multipath propagation than traditional method.
pp. 180-184

09:40 *Design and Implementation of A Chaotic Cipher Block Chaining Mode for Image Encryption*
Ta Hue (Ha Noi University of Science and Technology, Vietnam); Thang Manh Hoang (Hanoi University of Science and Technology, Vietnam); Safwan El Assad (École Polytechnique de l'Université de Nantes & IETR Laboratory, France)
This paper proposes and investigates a Chaotic Cipher Block Chaining mode (CCBC) which is to improve the security of a cryptographic algorithm and more resisting cryptanalysis. The size of both block and key are 512-bits. This approach makes the size of key greater than those of the current Data Encryption Standard (DES) and Advanced Encryption Standard (AES). The security analysis process proves that the proposed algorithm can resist the statistical and differential attacks. It also passed the key sensitivity test. The experimental results on Field Programmable Gate Array (FPGA) show the feasibility and effectiveness of the cryptosystem and indicates the trade-off between secure/performance/efficient and architecture hardware design.
pp. 185-190

T2: Tutorial 2

Cognitive Cooperative Communications: System Design and Performance Analysis
Maged Elkashlan, Trung Q. Duong, Vo Nguyen Quoc Bao, and Arumugam Nallanathan
Room: Hanoi
More and more of popularity of customers have posed a demanding challenge for current cellular networks. The most critical issue of wireless systems is to satisfy the ever increasing demand of multimedia services, which imposed a huge increase in bandwidth.

One of prominent solution is to use the cognitive radio concept, where secondary users (SUs) are allowed to concurrently occupy the same spectrum band which is assigned to primary users (PUs) as long as SUs' transmission do not cause any harmful interference on the PUs. The fundamental deadlock of cognitive radio systems is, however, the interference management problem between PUs and SUs, which leads to the fact that the secondary reliability is severely degraded. One important direction of research is to use the concept of cooperative communications, where relays have demonstrated a vital role in terms of enhancing secondary communications reliability. As a result, cognitive cooperative communications have appealed the mobile operators as an efficient approach to enhance coverage and capacity for future wireless communications. The following topics will be included:

- Cooperative spectrum sharing
- Security issues in cooperative cognitive networks
- Novel multiple access techniques in cooperative cognitive networks
- Relay selection techniques in cooperative cognitive networks
- Multi-hop and multiway techniques cooperative cognitive networks
- MIMO techniques in cooperative cognitive networks
- Hardware impairment issue in cooperative cognitive networks

10:00 - 10:20

Coffee Break

10:20 - 12:00

M2: Microwave & Antennas 2

Room: Hue
Chair: Mitsuo Taguchi (Nagasaki University, Japan)
10:20 *A method to miniaturize antenna structure for the 3G mobile device*
Ha Quoc Anh (Le Quy Don Technical University, Vietnam); Nguyen Quoc Dinh (Le Quy Don Technical University, Vietnam); Do Quoc Trinh (Le Quy Don Technical University, Vietnam)
This paper presents a miniaturization method of planar inverted F antenna structure by folded the monopole antenna placed on FR4 dielectric. The proposed antenna comprises compact size (23 × 14 × 5 mm3), easy to make and provide enough bandwidth, which covers 3G band (VSWR ≤ 2). Using the simulation program to optimize antenna structure and calculate the parameters of the antenna in order to verify its applicability for the 3G devices.
pp. 191-194
10:40 *Characteristics of Vertical L-shaped Folded Monopole Antenna Designed on a Ground Plane*
Akiharu Iwata (National Defence Academy, Japan); Tuan Hung Nguyen (National Defense Academy, Japan); Hisashi Morishita (National Defense Academy, Japan)

This paper presents the characteristics of a vertical L-shaped folded monopole antenna (VLFMA), which is mounted perpendicularly on a rectangular ground plane (GP) for taking into account space-saving design. By deploying the antenna element vertically to the GP, we show that it is possible to reduce the physical antenna area on GP significantly to about 21% compared to that of a conventional design, with good antenna characteristics being maintained.
pp. 195-198

11:00 *Mobile Phone Antenna for 2G, 3G and 4G Standards*

Le Huy Trinh (University of Nice Sophia Antipolis, France); Fabien Ferrero (EPIB-CREMANT, Université Nice-Sophia Antipolis, France); Robert Staraj (University of Nice-Sophia Antipolis, France); Jean Marc Ribero (LEAT, France)
In this letter, a novel mobile phone antenna for 2G, 3G and 4G standards is presented. Based on the folded inverted-L antenna associated with a ground stub, the proposed structure can operate in all the different bands of mobile telecommunications (GSM/UMTS/LTE). With a volume of 68x17 mm2 and placed on a FR4 Epoxy substrate, total efficiency of this structure is higher than 55% in the lower band (700-960 MHz) and 65% in the higher one (1700-2700 MHz).
pp. 199-202

11:20 *Bandwidth Maximization of a Vertical U-shaped Folded Dipole Antenna Designed for WiMAX*

Tuan Hung Nguyen (National Defense Academy, Japan); Yusuke Saita (National Defense Academy, Japan); Hisashi Morishita (National Defense Academy, Japan)
This study presents the method of maximizing the resonant bandwidth of a vertical U-shaped folded dipole antenna (VUFDA) that projects from a small ground plane, designed for WiMAX applications in two frequency bands of 2.3~2.7 GHz and 3.4~3.8 GHz. By applying a suitable formulation of the objective function which represents the resonant bandwidth of VUFDA in a particle swarm optimization (PSO), an optimal shape of VUFDA is derived, which has the maximum possible bandwidth that includes the two WiMAX bands (2.31~4.3 GHz for VSWR<3).
pp. 203-206

11:40 *Fundamental characteristics of L-shaped and U-shaped folded monopole antennas with parasitic elements for WiMAX/MIMO antenna*

Tsutomu Ito (National Defense Academy, Japan); Mio Nagatoshi (National Defense Academy, Japan); Shingo Tanaka (Yazaki Corporation, Japan); Hisashi Morishita (National Defense Academy, Japan)
In this study, fundamental characteristics of MIMO antennas are investigated using two types of folded monopole antennas (FMA) in order to cover more operational frequency bands of WiMAX. To increase the number of resonant frequencies, parasitic elements are used. As a result, one type of FMA could satisfy the two bands of WiMAX, and the other type of FMA could cover all the three bands of WiMAX with parasitic elements. Moreover, this was possible without increasing the total antenna volume. We confirmed the validity of the simulation by comparing with measured data.
pp. 207-210

N2: Network 2

Room: Saigon
Chair: Anh Tuan Le (Posts and Telecommunications Institute of Technology, Vietnam)
10:20 *Rate-Aware Relay Selection Scheme for Wireless Networks*

Dong Seong Kim (Kumoh National Institute of Technology, Korea); Tran Nhon (Kumoh National Institute of Technology, Korea)
This paper proposes a new relay selection scheme for wireless cooperative networks that effectively distributes traffic of packets from source nodes to the sink. By estimating the rate in two hops from source to relay and relay to destination, the source can choose the most optimal relay node to forward its messages. Simulation results indicate that our scheme is efficient in increasing packet delivery ratio and decreasing average energy consumption.
pp. 211-214

10:40 *Performance and Applicability of Geographic-based Routing in Smart Grid's Neighbor Area Networks*

Quang-Dung Ho (McGill University, Canada); Gowdemy Rajalingham (McGill University, Canada); Tho Le-Ngoc (McGill University, Canada)
Neighbor area network (NAN) is one of the most important segments of smart grid communications network (SGCN). This paper studies the performance of geographic-based greedy perimeter stateless routing (GPSR) in the NAN scenario and investigates the feasibility of this routing protocol in supporting SG applications. Specifically, packet transmission delay and reliability of GPSR in an IEEE 802.15.4-based wireless mesh NAN with practical system parameters are measured by simulations. The results show that, at the basic data rate, the delay can always be maintained below 70 ms (95% quartile) while packet delivery ratio is higher than 90%. This means that the simulated NAN can support a great number of SG applications including smart metering, real-time pricing, demand response, etc. However, due to that fact that more advanced applications that require information exchange at higher rates and more stringent delays are emerging in SG, the performance of GPSR in NAN scenarios using various radio technologies with higher offered loads and/or larger network scales needs to be studied.
pp. 215-219

11:00 *Applying Time-Reversal technique for tracking the mobility in opportunistic networks with random fading channels*

Vu Tran-Ha (Research and Development Center, Duy Tan University, Danang, Vietnam); Dac-Binh Ha (Duy Tan University, Vietnam); My-Kieu Nguyen-Thi (Research and Development Center, Duy Tan University, Vietnam)
Opportunistic network (ON) is particular type of delay-tolerant network. ON takes advantages of the broadcast nature of wireless medium to improve the transmission quality and range. In GPS-free environments, positioning is resolved by solutions basing on self-positioning, cooperative localization ... However, major disadvantage of these methods lies in requiring strict synchronization between each pair of sender and receiver. In this paper, we propose a novel tracking the mobility scheme of nodes based on Time-Reversal (TR) technique

without requiring strict synchronization and a new forwarding strategy is inferred. We simulate the processes in operation of new forwarding strategy basing on proposed mobility tracking. The simulation results show that applying TR technique for tracking mobility of nodes is efficient in finding forwarding nodes. And these results also indicate that there is a predicted duration time which the probabilities of sending packets to destinations has high value. Therefore, we can anticipate the optimal size of packets is used for the current state of the network.
pp. 220-225

11:20 *Optimizing Data Rate for Multiple Hop Wireless Body Area Network*

Pham Thanh Hiep (Yokohama National University, Japan); Ryuji Kohno (Yokohama National University, Japan)

Since the elderly population is increasing all over the world, health care market keeps growing and there is a need for monitoring of health issues. Body Area Network consists of wireless sensors attached on or inside human body for monitoring vital Health related problems, i.e, Electro Cardiogram (ECG), ElectroEncephalogram (EEG), Electronystagmogram(ENG) etc. Data is recorded by each sensor and sent toward coordinator through other sensors meaning multiple hop sensors WBAN system. The multiple hop system is being researched in many fields of wireless system, i.e, ad hod, mobile, ITS and so on. However, in these systems, the relay node just services as forwarding the data even in the multiple sources to multiple receivers system. Whereas, in WBAN system, almost the sensors forward the vital data of the other sensors while recording and sending the data of itself to the neighbor one. Therefore, due to the number of packets that is generated at all sensors, the probability of successful transmission and the packet loss are changed. It means that the vital data is lost and the transmit power is wasted. Main aim of this paper is to analyze the successful transmission probability and to optimize the packet rate of all sensors to obtain the highest efficiency in utilization.
pp. 226-230

11:40 *Developing a VM-based Hybrid DNS System with High Availability*

Chang-Sheng Chen (National Chiao Tung University, Taiwan); Chun-Hsien Su (National Chiao Tung University, Taiwan)

In this paper, we proposed to develop a set of low-cost, virtual machine-based (or VM-based) hybrid DNS scheme (i.e., a frontend + multiple backend systems) with a scalable capability to provide DNS services with high availability. In this study, we had built two use case diagrams, namely the frontend (i.e., load-balancer) and the backend (i.e., DNS resolving) subsystems, for modeling the overall system. Moreover, we had developed a two-phase DNS healthy check algorithm and designed two testing cases to help implement and/or evaluate the system. For validating the hybrid scheme, we had deployed the proposed DNS system, which had kept running smoothly for more than 2 years, on our campus network. As shown in this study, using the virtual machine (VM) technology enhances the speed of deploying the overall system, including both the frontend and backend subsystems. Meanwhile, it also makes the test of the hybrid system to become more effective (e.g., easier to reconfigure and/or to replace any backend DNS subsystem than the ones implemented in physical machines).

Furthermore, with some minor modifications, we suppose that the same scheme could be easily adapted and applied to other applications such as e-mail, and web systems for building a high-availability service.
pp. 231-236

10:20 - 11:20

P4: Poster 4

Microwave & Antennas
Room: Lobby
Chair: Van Yem Vu (Hanoi University Of Science and Technology & School of Electronics and Telecommunications, Vietnam)

Simulation and Experimental Study of Single-Loop Opto-Electronic Oscillator

Toan Thang Pham (ENS Cachan, France); Van Chi Pham (Hanoi University of Science and Technology, Vietnam); Tien Thong Pham (ENS Cachan, France); Van Yem Vu (Hanoi University Of Science and Technology & School of Electronics and Telecommunications, Vietnam); Isabelle Ledoux-Rak (ENS de Cachan, France); Bernard Journet (ENS de Cachan, France)

This paper presents a study of optoelectronic oscillator (OEO) simulation models in agreement with an experimental system. The experimental oscillator is based on an optical fiber of 1 km length and operates at 8 GHz. Modelling references are the theoretical study introduced by Yao & Maleki in 1996, and the computational method of Levy et al introduced in 2009. From the comparison between the experimental data and the theoretical formula of the phase noise, we can determine the power spectral noise density at the output of the photodetector. This value is then introduced as a physical parameter of the computational model with those already known. From that point it is possible to improve the simulation for a good agreement with the experimental data.
pp. 680-685

Single-Feed Wideband Circularly Polarized Antenna for 2.4 GHz ISM Band Applications

To Pham (Ho Chi Minh City International University, Vietnam); Nguyen Binh Duong (International University, Vietnam); Van-Su Tran (International University, HCMC VNU, Vietnam); Kien Trung Pham (Ho Chi Minh City International University, Vietnam)

A wideband circularly polarized antenna operating at 2.4 GHz industrial, scientific and medical band (ISM band) is presented in this paper. The proposed antenna consists of a truncated rectangular shape as the main patch, and two parasite U-shape patches. The antenna is fed by a single coaxial probe. The measurement and simulation results show that the proposed antenna achieves the broad impedance bandwidth of 10% and the 3-dB axial ratio bandwidth up to 13%. The results indicate that the proposed antenna is a good candidate for applications using 2.4 GHz ISM band.
pp. 686-688

A Log-Periodic Saw-Toothed Planar Antenna for UHF Ultra-Wideband Applications

Bui Huu Phu (Hochiminh City University of Technology, Vietnam)

This paper presents a proposed ultra-wideband (UWB) antenna for wireless applications in UHF range. The proposed antenna has a broad bandwidth with a relative small antenna size compared to conventional antennas. It is a 2-arm log-periodic saw-toothed planar microstrip antenna. This antenna has a simple structure with two arms located on the FR4 dielectric substrate. The simulation and implementation results have shown that the proposed antenna is directional and stable radiation patterns in the ultra wide operation bandwidth from 300 MHz to 1.1 GHz. This antenna can be used in UWB systems such as ground penetrating radar systems.

Design of Integrated LEO/GPS Antenna

Tran Huy Hung (Hanoi University of Science and Technology, Vietnam); Huynh Nguyen Bao Phuong (Hanoi University of Science and Technology, Vietnam); Nguyen Khac Kiem (Hanoi University of Science and Technology, Vietnam); Loan Pham-Nguyen (Hanoi University of Science and Technology & School of Electronics and Telecommunications, Vietnam); Chien Ngoc Dao (Hanoi University of Science and Technology, Vietnam)

In this paper, the design of a multi-band circularly polarized stacked microstrip antenna for low earth orbit (LEO) satellite communications and precise global positioning system (GPS) is proposed. The microstrip antenna for multi-band frequency is constructed by stacking two different square patches and circular polarization is obtained by different approaches. The top patch has a pair of truncated square corners, and the bottom patch is fed with two pins placed symmetrically on the two main axes. The antenna is designed to operate at L1 (1.575 GHz ± 12 MHz) and LEO at two frequency ranges uplink (148 - 150 MHz), downlink (137 - 139 MHz). All the design details and numerical results will be discussed in this context.

Tri-band Bandpass Filter Using Two Short Stubs and An Open Stub Loaded Resonator

Nguyen Tran Quang (Le Quy Don Technical University, Vietnam); MinhTan Doan (Le Qui Don Technical University, Vietnam); Ta Chi Hieu (Le Quy Don Technical University, Vietnam)

A tri-band bandpass filter (BPF) using two short stubs and an open stub loaded resonators is presented. The classical even-/odd-mode method is applied to analyze the characteristics of the proposed resonator, which shows that it has two pairs of symmetrical resonant modes. The center frequencies of the first and the third passband can be flexibly controlled by tuning the dimensions of two short stubs and an open stub, whereas the second passband frequency is fixed. To verify the proposed approach, a prototype of tri-band BPF centered at 1.57, 2.4 and 3.95 GHz is designed and fabricated. Measured results agree well with simulated ones.

A Design of Compact Ultra-Wide Band Antenna

Le Trong Trung (Le Quy Don Technical University, Vietnam); Nguyen Quoc Dinh (Le Quy Don Technical University, Vietnam); Hoang Dinh Thuyen (Le Quy Don Technical University, Vietnam)

In this paper, a new compact ultra-wide band (UWB) antenna for UWB application is proposed. This antenna is designed with the working bandwidth from 3.1 GHz to 10.6 GHz. The purpose is to design a simple and compact antenna which has a broad bandwidth VSWR ≤ 2. Antenna characteristics such as radiation pattern, maximal gain are also thoroughly investigated.
pp. 700-703

A Class-AB 0.8GHz-2.1GHz SiGe HBT Broadband Power Amplifier

Li Wenyuan (Institute of RF- & OE-ICs, Southeast University, P.R. China); Bian Miaomiao (Southeast University, P.R. China); Zhigong Wang (Southeast University, P.R. China)
A Class-AB 0.8GHz-2.1GHz broadband power amplifier integrated circuit is present in 0.13
pp. 704-707

10:20 - 12:00

T3: Tutorial 3

Towards greener data centers and clouds
Huu-Thanh Nguyen and Ngoc-Nam Pham
Room: Hanoi

Cloud computing and other data services in the recent years have become increasingly popular owing to the evolution of data center and parallel computing paradigms. New data center and cloud-based multimedia applications such as Video on Demand (e.g., YouTube), online storage and other cloud services etc., are becoming more common and are requiring additional network and server resources. Furthermore, data center networks nowadays are specifically designed to be extremely over dimensioned in terms of switching capacity and of number of deployed links and nodes to guarantee zero-loss and minimum latency packet forwarding. Thus, recent surveys have shown that the energy consumption in a data center considerably contributes to its operation costs. A remarkable part of the large energy volume consumed in data centers today is due to the over-provisioning of such network resources as switches, links, and servers to meet the stringent requirements on reliability. Therefore performance and energy issues are important factors for the design of large multi-tier data centers that can support multiple services.

The tutorial is divided into two parts. In the first part of the talk, we address the motivations for current research activities on the areas of Green ICT. Recent hot research topics for energy-efficient networking, especially green data centers and clouds will also be discussed. In the second part, experiences and research results within the framework of the project ECODANE (Reducing Energy COnsumption in Data center Networks) will be shared, including data center traffic measurement and modeling, energy profiling of network devices, energy-aware testbed, protocols and optimization algorithms.

12:00 - 13:30

Lunch Break

13:30 - 15:30

C3: Communication 3

Room: Hanoi
Chair: Matthias Pätzold (University of Agder, Norway)
13:30 *High Numerical Aperture Square Lattice Structure Photonic Crystal Fiber for Optical Coherence Tomography*

> Md. Anwar Hossain (Japan Society for the Promotion of Science (JSPS), University of the Ryukyus & Asian Institute of Technology (AIT), Japan); Takuro Yasui (University of the Ryukyus, Japan); Yoshinori Namihira (University of the Ryukyus, Japan)
> In optical coherence tomography (OCT) system, high numerical aperture (NA) PCF is required for collecting back scattering light for detailed information from body tissue. In this paper, we proposed a new structure of high NA zero dispersion single mode photonic crystal fiber (PCF) for OCT at 0.83 µm, 1.06 µm and 1.31 µm wavelengths which are used for ophthalmology, dermatology and dentistry, respectively. The properties of the proposed PCF are simulated by using finite difference method (FDM) with an anisotropic perfectly matched boundary layer. The PCF offers not only high NA but also both zero dispersion and single mode operation at each center wavelengths. These parameters improve transverse resolution which may obtain clear image of body tissues.
> pp. 237-240

13:50 *Modelling of Non-Stationary Mobile Radio Channels Using Two-Dimensional Brownian Motion Processes*

> Alireza Borhani (University of Agder, Norway); Matthias Pätzold (University of Agder, Norway)
> The interdisciplinary idea of this paper is to employ a two-dimensional~(2D) Brownian motion~(BM) process to model non-stationary mobile fading channels. It is assumed that the mobile station~(MS) starts moving from a fixed point along a random path in the 2D plane. We model such a moving scenario by a 2D BM process, in which the variance of the process determines the deviation of the MS from its starting point. The propagation area is modelled by a non-centred one-ring scattering model, where the local scatterers are uniformly distributed on a ring centred \emph{not} necessarily on the MS. The random movement of the MS in the proposed scattering model results in local angles-of-arrival~(AOAs) and local angles-of-motion~(AOMs) characterized by stochastic processes rather than random variables. We derive the first-order density of the AOA and AOM processes in closed form. The local power spectral density~(PSD) of the Doppler frequencies and the local autocorrelation function~(ACF) of the complex channel gain are also provided. The numerical results show that the proposed non-targeted Brownian path model results in a non-stationary non-isotropic channel model. The proposed trajectory model is very useful for characterizing irregular movements of mobile users. Furthermore, the pioneering idea of the paper

provides a new method for the modelling of mobile radio channels under non-stationary conditions.

pp. 241-246

14:10 *The Secrecy Capacity of Block Fading Multiuser Wireless Networks*

Arsenia Chorti (Princeton University & ICS FORTH, USA); Katerina Papadaki (London School of Economics, United Kingdom); Panagiotis Tsakalides (FORTH-ICS and University of Crete, Greece); H. Vincent Poor (Princeton University, USA)

The resilience of block fading wireless orthogonal frequency division multiple access (OFDMA) networks to passive eavesdroppers is investigated. The network secrecy capacity is evaluated in scenarios involving a base station and several terminals, some of which constitute passive eavesdroppers. Assuming a block fading Rayleigh channel, the probability of a secrecy outage during a transmission frame is evaluated with respect to a target secrecy rate in the following cases: (i) in the absence of any cooperation between the network nodes, and, (ii) when the full multi-user diversity is exploited both by the legitimate users as well as by the eavesdroppers. Remarkably, it is demonstrated that in a network of as few as 12 legitimate users and a single eavesdropper it is possible to transmit 1 bit/sec/Hz with a probability of secrecy outage less than 1%. Furthermore, the delay constrained secrecy capacity of this network is evaluated when the full channel state information (CSI) is available both at the base station and at all receiving nodes. A secure waterfilling scheme is discussed, satisfying a short-term power constraint.

pp. 247-251

14:30 *Real-Time Noise Identification in DSL Systems Using Computational Intelligence Algorithms*

Fabricio Farias (Federal University of Pará, Brazil); Gilvan Borges (UFPA, Brazil); Roberto Menezes Rodrigues (Federal University of Para, Brazil); Adamo Santana (Federal University of Para, Brazil); Joao Crisostomo Weyl Costa (UFPA, Brazil)

Despite the advances and improvements in the Digital Subscriber Line (DSL) technology, noise is still the main impairment. In special, far-end crosstalk, Radio Frequency Interference (RFI) and Impulsive Noise (IN) are of greatest concern and study. In DSL world, there are many noise mitigation techniques, but to know the impairment as a priori knowledge is a step necessary to apply the appropriate technique. In this paper we propose a new methodology for noise identification on real-time. Computational Intelligence (CI) algorithms are used in order to classify in real time the absence of noise or the predominance of IN, crosstalk or RFI. The algorithms are applied to a database composed by management information base (MIB) metrics. In order to ensure the database diversity, several DSL topologies using real cables were created and evaluated. In order to choose the best CI algorithm, a benchmarking was performed comparing the results achieved by naive Bayes, Bayesian belief networks and artificial neural networks based on backpropagation and on Radial Basis Function (RBF). The results demonstrate the potential use of CI for noise identification in DSL networks through MIB

metrics and the most difficult noise to be identified is pointed. Tests indicate the RBF algorithm achieving the best result with 99.6% of accuracy
pp. 252-255

14:50 *Efficient Uplink Transmission in Multiuser MIMO Systems using Uplink-Downlink Duality and Hybrid Optimization*

Farhan Khalid (University of Stuttgart, Germany); Joachim Speidel (University of Stuttgart, Germany)

We propose an efficient multiuser MIMO (MU-MIMO) uplink transmission scheme based on a two-stage iterative joint optimization process in the dual downlink, followed by an uplink transformation. The hybrid optimization consists of multiuser interference (MUI) mitigation complemented by sum mean-square error (SMSE) minimization under a sum-power constraint to enhance the average bit-error rate (BER) performance in the MU-MIMO uplink. The proposed algorithm is capable of providing high diversity gain when the transmitters are equipped with multiple antennas and converges exceptionally fast, requiring only a few iterations to achieve its maximum performance potential. We also consider a codebook based transmission mechanism for practical implementation of the proposed scheme.
pp. 256-260

15:10 *Robust Spectrum Sensing of DVB-T2 Signal Using the First Preamble Symbol*

Trung Thanh Nguyen (Faculty of Engineering, The University of Duisburg-Essen, Germany); Hanwen Cao (Universität Duisburg-Essen, Germany); Asim Burak Güven (Univerisity of Duisburg-Essen, Germany); Yuan Gao (University of Duisburg-Essen, Germany); Ammar Kabbani (Univerisity of Duisburg-Essen, Germany); Theo Kreul (University of Duisburg-Essen, Germany); Thomas Kaiser (Universität Duisburg-Essen, Germany)

In the research on spectrum sensing, many works focus on TV bands, in which primary user signals follow digital video broadcasting-terrestrial (DVB-T) standard. However, DVB-T2 is the next generation of this standard. Some characteristics of the primary signal are changed including the pilot pattern and the cyclic prefix (CP). This issue results that the existing sensing algorithms based on the characteristics of DVB-T are not suitable for DVB-T2 signal, or become complex. In this paper, we propose a new sensing algorithm for DVB-T2 signal based on the first preamble symbol of DVB-T2 frame. We derive analytical forms for the detection. The detector works well at the SNR of -10dB with the false alarm of 0.01, with very short sensing time (0.224ms) and with all configurations of DVB-T2. Moreover, we propose a sensing scheme based on this algorithm for practical cognitive radio systems.
pp. 261-265

C4: Communication 4

Coding
Room: Hue
Chair: Francis C.M. Lau (The Hong Kong Polytechnic University, Hong Kong)
13:30 *A Novel AFC Scheme for Walsh-Hadamard Code Division Multiplexing*

Toshiharu Kojima (The University of Electro-Communications, Japan); Ayako Suzuki (The University of Electro-Communications, Japan)

In this paper, we propose a novel automatic frequency control (AFC) scheme for code division multiplexing (CDM) system employing Walsh code. The proposed AFC scheme discriminates the frequency shift of the received signal by detecting the signal energy after Walsh-Hadamard transform (WHT). The configuration of the proposed AFC scheme is analogous with that of delay locked loop (DLL) for direct-sequence spread-spectrum (DS-SS) communications. The initial acquisition performance of the proposed AFC scheme is evaluated by computer simulation. It is confirmed that the proposed AFC scheme achieves fast acquisition when the multiplexing factor is less than WHT order.

pp. 271-274

13:50 *A Construction of LDPC Codes with Low Error Floors*

Tsung-Hsin Yeh (MediaTek Inc., Taiwan); Wen-Yao Chen (National Tsing Hua University, Taiwan); Chung-Chin Lu (National Tsing Hua University, Taiwan)

In this paper, we propose an effective method to construct practical LDPC codes with low error floors. We first consider a class of LDPC codes, called LU_mk codes each of which is obtained by removing edges and nodes from the Tanner graph of an LU code and may have arbitrary large girth and high code rate. We then derive a lower bound for the stopping distance of an LU_mk code and develop a simple method to further purge edges and nodes to obtain a small code ensemble with relatively lower error floors than the original LU_mk code ensemble.

pp. 266-270

14:10 *Efficient Quantization Scheme for Lattice-Reduction Aided MIMO Detection*

Wei Hou (The Uinversity of Electro-Communications, Japan); Tadashi Fujino (The University of Electro-Communications, Japan); Toshiharu Kojima (The University of Electro-Communications, Japan)

In this paper, we present an efficient quantization scheme for lattice-reduction (LR) aided (LRA) MIMO detection using Gram-Schmidt orthogonalization. For the LRA detection, the quantization step applies the simple rounding operation, which often leads to the quantization errors. Meanwhile, these errors may result in the detection errors. Hence, the motivation of the proposed detection is to further solve the problem of degrading the performance due to the quantization errors in the signal estimation. In this paper, the proposed quantization scheme decreases the quantization errors using a simple tree search with a threshold function. Through the analysis and the simulation results, the proposed detection can achieve the near-ML performance with only a little additional complexity.

pp. 275-279

14:30 *A Class of Doubly-Generalized LDPC Codes*

Yue Min (Hong Kong Polytechnic University, Hong Kong); Francis C.M. Lau (The Hong Kong Polytechnic University, Hong Kong); Chi Kong Tse (Hong Kong Polytechnic University, Hong Kong)

We propose a class of doubly-generalized LDPC (DGLDPC) codes that use single-parity-check (SPC) codes as component codes at the super-variable nodes (SVNs) and SPC product-codes (SPC-PCs) as component codes at the super-

check nodes (SCNs). We propose a low-complexity iterative decoding algorithm catered for the special structures of the SPC-PCs. Finally, we present the error performance and the convergence rate of the proposed DGLDPC codes.
pp. 280-284

14:50 *Joint error control and dynamic security coding*

Trang Thi Huyen Nguyen (École Normale Supérieure de Cachan, France); Jean-Pierre Barbot (Ecole Normale Superieure de Cachan, France)

Security and error control coding are two crucial aspects of the digital communication systems. The increasing deployment of systems easy to eavesdrop, such as wireless systems, makes strategic the protection of the data secrecy. This paper presents an encryption scheme allowing to jointly perform an error control and dynamic coding in only one step. Based on the dynamic observation of the reciprocal propagation channel between the legitimate nodes, a "session key" is generated in order to manage the channel coding system, namely a turbo-code. This new scheme allows a dynamic security coding without change of the hardware structure of the transceiver devices.
pp. 285-290

15:10 *Noise Estimation in DSL Systems using Linear Regression*

Fabricio Farias (Federal University of Pará, Brazil); Gilvan Borges (UFPA, Brazil); Waldeir Monteiro (UFPA, Brazil); Daniel L. Silva (Federal University of Para, Brazil); Joao Crisostomo Weyl Costa (UFPA, Brazil)

The Digital Subscriber Line systems performance tightly depends on noise interference. The users (lines) in the binder create mutual interference (crosstalk), therefore decreasing the rates of all users. Crosstalk noise is more predominant in DSL and its major performance bottleneck is to achieve high-speed data rate. This study proposes a new real-time monitoring methodology for noise estimation based on Management Information Base (MIB) metrics. Linear regression is used for fitting, in which input parameters are MIBs and the output is the estimated noise power. The results confirm the possibility of estimating noise with a general equation. Moreover, it is shown the result improvement and if a Loop Topology Identification tool is used as prior knowledge.
pp. 291-294

13:30 - 14:30

P5: Poster 5

Electronics
Room: Lobby
Chair: Linh Mai (International University of Viet Nam, Vietnam)

UWB Pulse Generator switched by the PSK modulation based on a band pass filter with two zeros transmissions

Richard Thai Singama (Royal Military Academy - Institut Galilée UP13 & CISS - Université Paris 13 LPL Institut Galilée CNRS UMR 7538, France); Frédéric Du-Burck (Université Paris 13 - Institut Galilée, France); Marc Piette (Royal Military Academy, Belgium)

We propose a simple and original method to generate short UWB pulses. They are obtained as the transient response of a bandpass filter (with two zero of transmissions) to an PSK (Phase-shift keying) signal with a digital frequency centered at the rejection frequency. From this principle, we show that pulses with a spectrum satisfying the FCC regulatory mask can be obtained by an additional filtering. And can be applied to the generation of pulses matched to any type of available spectrum mask (European, imaging, medical, outdoor, radar, …). The circuit is developped to demonstrate these principles. It is shown that the measurements are in good agreement with the theory.
pp. 708-712

Bui Van Thanh Trung (iCRco, Vietnam); Nguyen Van Cuong (Danang University of Technology, Vietnam)
From our ideas and the demand to control and to monitor household appliances (eg lights, fans, pumps, shower, etc) anywhere by using mobile handset through GSM technology, this paper is aimed to present a new idea of using the embedded system on FPGA platform with the microprocessor MicroBlaze and the real time operating system FreeRTOS to control and to monitor household appliances through GPRS and using the PIR sensor to carry out monitoring break-in. Due to the strict requirements of the time constraints, the use of resources and the importance of scheduling, real-time operating system (RTOS) plays a very important role in the development of embedded systems.
pp. 713-717

Hung Kim Nguyen (The University of Science, Hochiminh City & Faculty of Electronics and Telecommunications, Vietnam); Thuc Hoang (The University of Science, Hochiminh City & The Faculty of Electronics and Telecommunications, Vietnam); Bui Trong Tu (University of Science Ho Chi Minh City, Vietnam)
Nowadays, IP watermarking becomes the state-of-the-art technique in the field of IP protection. This technique aims at implanting a message such as a signature into the structure while remains the functionality of the original circuit. One of the mainstreams in IP watermarking research is the Finite State Machines (FSM) watermarking. In this paper, we propose two FSM watermarking techniques which embed a signature of the IP creators in the state-transition-graph (STG) by adding new states, so-called watermarked states (WS). They are Front-added Watermarked States (FAWS) and Back-added Watermarked States (BAWS). Two FSM cores, i.e. simple CPU and UART transmission, are built and watermarked successfully in order to verify the effectiveness of the proposed techniques. Experimental results show that the FAWS method has the average cell, area, and power overhead is 14.25%, 6.47%, and -3.27%, respectively. Likewise, the increasing of cell, area, and power of the BAWS method is 15.63%, 8.16%, and -4.18%,
pp. 718-723

Montree Kumngern (King Mongkut's Institute of Technology Ladkrabang, Thailand); Supavadee Kunglee (KMITL, Thailand)

This paper presents a new analog vector summation using dual-X second-generation current conveyors (DXCCIIs) as active element. The proposed vector summation employs two DXCCIIs and seven MOS transistors operating in saturation region, which is suitable for integrated circuit implementation. The circuit offers the high operating frequency using MOS devices in saturation region. PSPICE simulators using 0.35 um TSMC CMOS process are used to validate the workability of the new circuit. The simulation results show that the circuit has a -3dB bandwidth of 450 MHz.
pp. 724-727

Hardware Design and Implementation of MIMO Eigenbeam-Space Division Multiplexing Systems for Future Wireless Communications Networks

Bui Huu Phu (Hochiminh City University of Technology, Vietnam)
Multiple-input multiple-output (MIMO) systems applying the Eigenbeam-Space Division Multiplexing (E-SDM) technique can be considered as optimal MIMO systems because of providing the highest channel capacity and good communications reliability. In the systems, orthogonal transmission beams are formed between transmit and receive sides; and also optimal transmit input data are adaptively allocated. In addition, a simple detection can be used at receiver to totally eliminate sub-stream interference. Therefore, MIMO E-SDM systems have been considered as a good potential technology for future high speed data transmission networks. Although there have been a lot of technical papers evaluated the systems based on theory analyses and/or computer-based simulation, just few ones have been considered the MIMO E-SDM systems based on hardware design. The main contribution of this paper is to present our own full design and implementation of 2x2 and 2x3 MIMO E-SDM systems on FPGA Altera Stratix DSP Development KIT using Verilog HDL, an important step before going to make integrated circuits. The bit-error rate performance of these systems has shown that our design is successful. In the paper, we also show the consumption of FPGA elements for our design of the systems.
pp. 728-732

An Electronically Tunable Current-Mode First-Order Allpass Filter Using a CCCCTA

Montree Kumngern (King Mongkut's Institute of Technology Ladkrabang, Thailand)
This paper presents a new current-mode first-order allpass filter employing only one current-controlled current conveyor transconductance amplifier (CCCCTA), one capacitor and one MOS resistor. The pole frequency and the current gain of the filter can be controlled electronically by the bias currents of the CCCCTA. Also both inverting and non-inverting allpass filters can be achieved into a single circuit. No component-matching condition requirements are needed for realizing m CMOS is   allpass filtering function. PSPICE simulation using TSMC 0.25 performed to examine the proposed filter.
pp. 733-736

Design of On-Chip Antenna for UWB Communications Systems

Nguyen Chi Nhan (University of Science, VNU-HCM & VNU-HCM City, Vietnam)

This paper presents the design and performance of an on-chip antenna for UWB communications systems. The antenna is a miniaturized monopole planar antenna that designed to radiate directly from the silicon die with compact dimensions of (2.6x1.3x0.7)mm3. The antenna is designed for co-integration with CMOS impulse radio ultra wideband (IR-UWB) pulse generator (6-10GHz) which is designed using 130nm CMOS technology. The designed antenna supports communication between 8.4-10.4GHz with │S11│<-10dB and gain of -14dB. The results have proved the viability of planar antennas on silicon and can lead to the fabrication of highly efficient RF circuits.
pp. 737-739

Dynamic Control of Effective Area and nonlinearity by changing Ge-doped rate for photonic crystal fibers

Miyagi Kazuya (1 Senbaru, Japan); Yoshinori Namihira (University of the Ryukyus, Japan)
We can obtain important optical transmission values of Germanium doped-photonic crystal fibers of the effective area, extreme higher nonlinear coefficient (variable range 8.22-18.1[W-1km-1]), and lower confinement loss than conventional pure-SiO2 based PCFs by changing Ge-doped rate, respectively with core regions, using numerical analysis and actual measurement results, bi-directionally.
pp. 546-548

13:30 - 15:30

SS: Special Section: Green Communication

Room: Saigon
Chair: Sumit Darak (Université Européenne de Bretagne (UEB) & Supélec, France)
13:30 *Blind Wireless Standard Identification for Green Radio Communications*

Babar Aziz (IETR / SUPELEC, Campus de Rennes, France); Amor Nafkha (SUPELEC/IETR, France); Jacques Palicot (IETR/Supélec, France); Honggang Zhang (Université Européenne de Bretagne (UEB) and Supelec & Zhejiang University, France)
In this paper, we focus on blind identification of standards for Green Communications. The aim of Green Communications is to propose solutions to overcome the rapid increase in energy consumption in communication and networking devices. Cognitive Radio (CR) presents itself as a set of concepts which can help achieve the goals of Green Communications, since a CR device collects information from surroundings and improves its behavior accordingly. One way to achieve Green Communication is to select a standard for communication which requires less transmission power. Thus, the CR device must be capable of identifying all the standards in its surroundings in order to select one. In this paper, we implement a bandwidth shape detector and a pilot based detector. These detectors are the building blocks of the so called Blind Standard Recognition Sensor (BSRS) for a CR. The performance of the proposed method is evaluated both through simulations and experiments conducted using

USRP n210 with Matlab/Simulink. The simulation results show that the proposed blind bandwidth identifier and pilot based detector work well at low SNR values. The experiments were realized under line-of-sight transmission conditions, however, the results show that the designed system is indeed able to discriminate several standard-like spectrums under real transmission conditions using their different bandwidth shapes.

pp. 295-300

13:50 *Low Power Optical Transceivers for Switched Interconnect Networks*

Yury Audzevich (University of Cambridge, United Kingdom); Philip M Watts (University of Cambridge & University College London, United Kingdom); Andrew West (University of Cambridge, United Kingdom); Alan Mujumdar (University of Cambridge, United Kingdom); Jon Crowcroft (University of Cambridge, United Kingdom); Andrew W. Moore (University of Cambridge, United Kingdom)

The power-consumption of network equipment is under ever-increasing scrutiny. As part of an ensemble project seeking to reduce power-consumption within data-centers, this work focuses on reducing the power required to represent data in the commonly used photonic networks. Utilising an open-source toolkit, we show that SERDES dominates power consumption of traditional optical transceivers. This result has particular implications for the modulation format of future interconnects. At 25 Gb/s line rate, SERDES blocks of PAM-16 and 4-wavelength WDM are shown to have 53% and 79% lower power respectively compared with SERDES of serial NRZ as well as reduced power gating restoration time and energy.

pp. 301-306

14:10 *Energy-Aware Topology Management for High Capacity Density Temporary Event Networks*

Salahedin Rehan Sarria (University of York, United Kingdom); David Grace (University of York, United Kingdom)

This paper introduces an energy-aware topology management scheme which aims to reduce energy consumption by switching off as many underutilised base stations as possible in beyond next generation temporary event mobile broadband networks. The scheme aims to neutralise the effect of uneven traffic distribution scenarios during a temporary event occurrences. It is shown that the scheme successfully tunes the ON/OFF state of the base stations depending on traffic demands. In addition, the scheme reduces the effect of having a hotspot in terms of energy consumption when using other proposed green topology management schemes, saving around 20% more of energy on average for medium and high offered traffic (>200 Erlangs) without prejudicing the system QoS.

pp. 307-311

14:30 *ECODANE: A Customizable Hybrid Testbed for Green Data Center Networks*

Nguyen Huu Thanh (Hanoi University of Science and Technology, Vietnam); Cuong Bui (Hanoi University of Science and Technology, Vietnam); Thien To (Hanoi University of Science and Technology, Vietnam); Pham Nam (HUST, Vietnam); Thu Ngo (Hanoi University of Science and Technology, Vietnam)

In this paper we propose a new testbed architecture that combines hardware network devices with virtual emulation test environment to improve scalability, flexibility and accuracy.The testbed enables to design and experiment new concepts for energy-efficient data center. It is based on OpenFlow, a Software Defined Networking (SDN) technology that facilitates the deployment of energy-aware protocols and mechanisms.
pp. 312-317

14:50 *Efficient Spectrum Sensing For Green Cognitive Radio Using Low Complexity Reconfigurable Fast Filter Bank*

Sumit Darak (Université Européenne de Bretagne (UEB) & Supélec, France); Honggang Zhang (Université Européenne de Bretagne (UEB) and Supelec & Zhejiang University, France); Jacques Palicot (IETR/Supélec, France); A P Vinod (NTU, Singapore)

In this paper, an efficient spectrum sensing scheme to search the vacant frequency bands of desired bandwidth for green cognitive radios (GCRs) is proposed. The proposed scheme consists of low complexity reconfigurable fast filter bank (RFFB) followed by a bank of detectors and learning algorithm based on empirical observations. The RFFB allows high resolution control over subband bandwidth without hardware re-implementation. The simulation results show that the proposed N-subband RFFB based spectrum sensing scheme offers improved performance in terms of searching all the available vacant bands of desired bandwidth compared to N-subband uniform filter banks and other reconfigurable filter banks. The proposed scheme also offers improved performance in terms of searching the wide vacant bands which in turn protect the secondary (unlicensed) users against flat as well as frequency selecting fading. The complexity comparison indicates that total estimated gate count of the RFFB is substantially lower than other filter banks.
pp. 318-322

15:10 *Joint Maximum Likelihood Decoding with Limited Number of Receive Antennas in Overloaded MIMO-OFDM System*

Yukitoshi Sanada (Keio University, Japan)

This paper presents a joint decoding scheme for block coded signals in an overloaded multiple-input multiple-output (MIMO)-OFDM system. In a normal MIMO-OFDM system, the number of the transmit antenna is the same as that of the received antenna. In the conventional MIMO system, symbol detection is carried out over the signals received by multiple antenna elements and is separated from decoding. However, in order to increase the throughput of the system, a more number of antenna elements is required, which leads to larger power consumption owing to additional radio frequency (RF) units. Instead of splitting detection and decoding, in this paper, a joint maximum likelihood (ML) decoding scheme in an overloaded MIMO-OFDM system is presented. Based on ideal interleaving, independence among coded symbols spread over subcarriers is assumed. As an example of the proposed system, bit error rate performance of Hamming coded and spatially multiplexed signals with the joint ML decoding on a Rayleigh fading channel is investigated. Furthermore, a complexity reduction scheme of the joint ML decoding is also evaluated through computer simulation

and bit error performance with the proposed complexity reduction scheme is presented.
pp. 323-327

15:30 - 15:50

Coffee Break

15:50 - 17:30

B1: Biomedical Engineering

Room: Hanoi
Chair: Nguyen Linh-Trung (Vietnam National University, Hanoi, Vietnam)
15:50 *An Effective Procedure for Reducing EOG and EMG Artefacts from EEG Signals*
Nguyen Thi Anh Dao (University of Technology and Logistics, Vietnam); Tran Duc Nghia (Institute of Information Technology, Vietnam); Nguyen Thi Hao (VNU Ha Noi, Vietnam); Tran Duc Tan (University of Engineering and Technology (UET), VNUH, Vietnam); Linh Trung Nguyen (Vietnam National University, Vietnam)
Epilepsy is a neural disorder in which the electrical discharge in the brain is abnormal, synchronized and excessive. Scalp Electroencephalogram (EEG) is often used in the diagnosis and treatment of epilepsy by examining the epileptic seizures and epileptic spikes. By modeling the signal acquired at each electrode of the EEG measurement system as a linear combination of source signals generated in the brain, we can apply Blind Source Separation (BSS) techniques to separate the brain activity from other activities. In this paper, we concentrate on applying Second-Order Blind Identification (SOBI) algorithm to remove eye (EOG) and muscular (EMG) artifacts. However, the disadvantage of SOBI is that it cannot provide the information about the order of sources, thus, an identification procedures of artifacts is further needed. The effectiveness of this method has been examined and verified by simulated and experiment data.
pp. 328-332
16:10 *Autoregressive Neural Networks for Recognition of Eye Commands in an EEG-Controlled Wheelchair*
Hai Thanh Nguyen (International University, Vietnam); Nguyen Trung (UTE-HCMC, Vietnam); Vo Toi (HCMIU, Vietnam); Van-Su Tran (International University, HCMC VNU, Vietnam)
This paper represents Autoregressive (AR) neural networks for recognizing eye movement commands for control of an electrical wheelchair using EEG technology. The eye movements such as opening eyes, blinking eyes, glancing left and glancing right related to a few areas of human brain were investigated. A Hamming lowpass filter was applied to remove noise and artifacts of the eye movement signals and to extract the frequency range of the measured signals. An autoregressive model was employed to produce coefficients containing features of the EEG eye signals. The coefficients obtained were inserted the input layer of a

neural network model to classify the eye activities. From the identified output of the network, the wheelchair was controlled to follow the desired direction of user. Experimental results of controlling the wheelchair in the indoor environment showed to illustrate the effectiveness of the proposed approach

pp. 333-338

16:30 *Tracking Landmarks for Control of an Electric Wheelchair Using a Stereoscopic Camera System*

Ba Viet Ngo (University of Technical Education Ho Chi Minh City (UTE), Vietnam); Hai Thanh Nguyen (International University, Vietnam); Nguyen Hung (UTE-HCMC, Vietnam)

An electrical wheelchair developed to operate in the indoor environments automatically avoids obstacles to move to the desired target for severely disabled people using a stereoscopic camera system. This paper presents a self-propelled control algorithm based on landmarks numbered in order. A SURF algorithm was applied to identify the landmark position, at the same time the "Bumblebee" camera was used to determine the depth parameter of the environmental images for control calculation. Based on this information, the wheelchair can locate where it is by using geometric projection algorithm. The results showed that the wheelchair automatically detected the landmarks to reach the desired target. This means that the proposed method is reliable and effective.

pp. 339-344

16:50 *An Energy-Efficient Implant Transponder for Continuous Glucose Monitoring*

Thanh Trung Nguyen (University of Oslo, Norway); Philipp Häfliger (University of Oslo, Norway)

The paper presents an integrated transponder with an inverter based readout circuit for continuous glucose monitoring in a wireless micro-implant. For this application the system takes advantage of an extremely low duty cycle and reduces power consumption significantly by only being powered for 96 us every 5 minutes. It is powered by a 13.56 MHz radio frequency (RF) signal and performs sensor signal amplification, analog to digital conversion (ADC) and uplink data transmission through load shift keying (LSK). It is energy-optimized for a piezoresistive pressure sensor as employed in a recently presented glucose sensor that transduces glucose concentration into osmotic pressure. The transponder has been produced in 90nm CMOS technology. The total energy consumption on the implant side after rectification (including sensor power as the major energy drain) is 14.4 nJ per sample for 8.42 effective bits. With a sampling rate of once per every 5 minutes this translates into a continuous consumption of 48.5 pW, so even considering a very low efficiency of the wireless power transmission the implant would no longer figure as a limiting factor for the battery lifetime of a reader unit.

pp. 345-350

17:10 *Computation of Magnetohydrodynamics by Using the Generalized Functions and Magnetic Equations*

Le Chi Kien (Ho Chi Minh City - University of Technical Education, Vietnam)

There are many computational methods for calculation and simulation of MHD plasma flows. This paper develops a new computational method based on the core results of the exist computations. The new computation is called non-symmetric

equilibria solver (NES). The fundamental of this computation is to use a calculation similar to multi-fluid code with the external boundary wrapper. The conditions to apply this new computation are isentropic plasma and short collision time between any particles in the plasma. Thus, the MHD equations which is normally used in the non-equilibrium plasma can be solved. It is desired that the computation can be modified to consider MHD phenomena in both non-equilibrium and equilibrium plasma models.
pp. 351-354

E2: Electronics 2

Room: Hue
Chair: Richard Thai Singama (Royal Military Academy - Institut Galilée UP13 & CISS - Université Paris 13 LPL Institut Galilée CNRS UMR 7538, France)
15:50 *Formal Co-Verification of Local Interconnect Network Master Node*
Minh Nguyen (Hanoi University of Science and Technology, Vietnam)
In this paper, we describe a case-study of formal co-verification of a Local Interconnect Network (LIN) master node which is implemented as an embedded system. We use the framework described in [1] to formally co-verify the LIN master node. However, as the proof problem of verifying global behaviors of the LIN master node is complex and exceeds the capacity of a state-of-the-art formal property checker, we apply an abstract technique to reduce the size of the LIN master node implementation. In our abstraction technique, only LIN protocol-related behaviors are kept in the new, simplified LIN master node. After abstraction, we can successfully verify a global property against the LIN master node.
pp. 355-359
16:10 *Hardware Implementation for Entropy Coding and Byte Stream Packing Engine in H.264/AVC*
Ngoc-Mai Nguyen (CEA, LETI, France); Edith Beigne (CEA, LETI, France); Suzanne Lesecq (CEA-LETI & MINATEC Campus, France); Pascal Vivet (MINATEC, France); Duy-Hieu Bui (Vietnam National University, Hanoi, Vietnam); Xuan-Tu Tran (Vietnam National University, Hanoi, Vietnam)
Entropy coding and data packing are the major phases in video coding. The new video coding standard, H.264 Advanced Video Coding (H.264/AVC), has adopted Exp-Golomb and Context-Adaptive coding methods to increase data compression ratio. In this paper, we proposed a hardware architecture of entropy encoding and byte stream data packing engines for H.264/AVC. Our entropy coding engine, that contains Exp-Golomb and Context-Adaptive Variable Length Coding (CAVLC), supports baseline and main profile of the standard. The proposed architecture was implemented using 180nm technology from AMS. The design consumes 4.2mW at the operating frequency of 30MHz.
pp. 360-365
16:30 *A CMOS Four-Quadrant Current Multiplier Using Electronically Tunable CCII*
Montree Kumngern (King Mongkut's Institute of Technology Ladkrabang, Thailand)

This paper presents a new analogue four-quadrant current multiplier using electronically tunable second-generation current conveyor. The proposed structure is highly suitable for implementation in low cost technology as CMOS technology. PSPICE simulators using the 0.5 um CMOS parameters are performed to confirm the workability of the proposed structure. The simulation results show that the proposed multiplier yields excellent temperature stability and good analog multiplication.
pp. 366-369

16:50 *A 0.18-μm-CMOS Low-Power Reconfigurable Low Pass Filter for Multi-Standard Receivers*

Kuan Bao (Southeast University, P.R. China); Xiangning Fan (Southeast University, P.R. China); Zhigong Wang (Southeast University, P.R. China)
This paper presents a 4th order continuous-time low-power reconfigurable low pass filter (LPF) using active-Gm-RC structure for multi-mode multi-standard communications. Programmable OTAs (operational amplifier) and R-C arrays are employed to realize the reconfiguration of cut-off frequencies, power consumption, and linearity of the LPF. Designed and fabricated in 0.18 μm CMOS technology, the proposed LPF achieves a measured reconfigurable cut-off frequency from 1.39 to 10.6 MHz with the consumed power from 0.45 to 1.35 mW. The measured dc gain is 17.3 dB and the 1-dB compression point is -9.7 dBVpp. The proposed LPF occupied an area of 0.64 mm2 including testing pads.
pp. 370-373

17:10 *Heterogeneous Hardware Accelerator Architecture for Streaming Image Processing*

Cuong Pham-Quoc (Delft University of Technology & Computer Engineering Lab, The Netherlands); Zaid Al-Ars (Delft University of Technology, The Netherlands); Koen Bertels (Delft University of Technology, The Netherlands)
This paper proposes a heterogeneous hardware accelerator architecture to support streaming image processing. Each image in a data-set is pre-processed on a host processor and sent to hardware kernels. The host processor and the hardware kernels process a stream of images in parallel. The Convey hybrid computing system is used to develop our proposed architecture. We use the Canny edge detection algorithm as our case study. The data-set used for our experiment contains 7200 images. Experimental results show that the system with the proposed architecture achieved a speed-up of the kernels by 2.13x and of the whole application by 2.40x with respect to a software implementation running on the host processor. Moreover, our proposed system achieves 55% energy reduction compared to a hardware accelerator system without streaming support.
pp. 374-379

S3: Signal Processing 3

Room: Saigon
Chair: Masaaki Ikehara (Keio University, Japan)
15:50 *An Improvement of Curvelet Based Super-Resolution Image Processing Implemented on ARM AT91SAM9RL*

Thuong Le-Tien (Hochiminh city University of Technology, Vietnam); Khoa Le (University of Technology, Vietnam); Cao Bui-Thu (Ho Chi Minh City University of Industry, Vietnam)

This paper copes with the problem of improving the quality of the curvelet interpolation in super-resolution image reconstruction. The curvelet interpolation has been proposed by some authors, however the quality of reconstructed images from their implementation is not as high as expected and the processing time is also not efficient. To improve the curvlet interpolation, a 2-stage interpolation algorithm in the curvelet domain combined to a filtering step for the reconstruction is proposed. The interpolated images are compared with images provided by other previous High-Resolution reconstruction methods and to the ideal interpolation. The experiments in Matlab and hardware based approach show the appropriate improvements of PSNR and MSE in comparison with the other previous methods.

pp. 380-385

16:10 *Brightness Preserving Weighted Dynamic Range Histogram Equalization for Image Contrast Enhancement*

Thien Huynh-The (Ho Chi Minh City University of Technical Education, Vietnam); Thuong Le-Tien (Hochiminh city University of Technology, Vietnam)

In this paper, an effective method Brightness Preserving Weighted Dynamic Range Histogram Equalization (BPWDRHE) is proposed. Although, the Histogram Equalization (HE) is an universal method, it is not suitable for consumer electronic products because this method cannot preserve the overall brightness and the output image has unnatural looking and more visual artifacts. An extending of approach based on the Brightness Preserving Bi-Histogram Equalization method [2], the BPWDRHE is proposed as the effective contrast enhancement method. This method uses within-class variance to separate a histogram into sub-histograms for minimizing the brightness shift with HE independently. Besides, the dynamic range can be controlled to adaptive to various types of input images through scale factors. Then, the HE-based histogram will be smoothed and normalized to obtain a comfortable visualization. The experimental results are presented and compared with the other brightness preserving methods.

pp. 386-391

16:30 *Real-time Audio Surveillance System for PTZ Camera*

Quoc Nguyen Viet (Room 1301, Hyungnam Engineering Building, Soongsil University, Korea)

In this paper, we propose an audio surveillance system to detect and localize dangerous sound in real-time so as to be able to direct a PTZ camera to catch a snapshot image about the location of sound source instantly. The proposed audio surveillance system firstly detects foreground sound based on adaptive Gaussian mixture background sound model, and classifies it into one of pre-trained classes of foreground sounds based on GMM model. Next, it decides whether it belongs to dangerous class group or not. If it does, then a sound source localization algorithm based on Dual delay-line algorithm is applied to localize the sound source. Finally, the proposed system uses the sound source location information

to pan and tilt the PTZ camera towards the orientation of the dangerous sound source, and take a snapshot against over the sound source region. Experiment results show that the proposed system can detect foreground sound stably and recognize dangerous sounds with a precision of 79% while the sound source localization can estimate orientation of the sound source with acceptably small error.
pp. 392-397

16:50 *Scene description for visually impaired in outdoor environment*

Nguyen Quoc Hung (Hanoi University of Science and Technology, Vietnam); Thi-Thanh-Hai Tran (Hanoi University of Science and Technology, Vietnam)
Helping visually impaired people navigating and feeling the surrounding environment is a very important and useful task. In this paper, we propose working on visual analysis of environment surrounding the blind person. The analysis is based on GIST features extraction and k-NN method for classification. The analysis results will help blind people to understand where he is and what is happening. We have tested in real field with a pseudo blind people walking in the campus of Gent University with 6 changing scenes. The scene recognition rate is about 85% which make us a confidence to build description systems for blind people in reality.
pp. 398-403

17:10 *Leaf based plant identification system for Android using SURF features in combination with Bag of Words model and supervised learning*

Quang-Khue Nguyen (Faculty of Information Technology, Hanoi University, Vietnam); Thi-Lan Le (MICA, HUST, Vietnam); Ngoc-Hai Pham (Hanoi University of Science and Technology, Vietnam)
Even many works have been proposed for automatic plant identification, there exists very few plant identification application on the market. To the best of our knowledge, Leafsnap [1] is the first automatic plant identification application. However, this application is dedicated to iOS users and is working with tree species of the Northeastern United States. Today, a huge number of Android users makes an interesting market for developing plant identification for Android. The contribution of this paper is two-fold. Firstly, we propose a leaf based plant identification method using SURF features in combination with Bag of Words and supervised learning. This method obtains better results in comparison with other existed methods in the same database. Secondly, we develop a leaf based plant identification system for Android.
pp. 404-407

Friday, October 18

08:00 - 10:00

C5: Communication 5

Information Theory
Room: Hanoi

Chair: Nam Xuan Tran (Le Quy Don University (LQDTU), Vietnam)

08:00 *Performance Analysis of Randomized Distributed Space-Time Codes in Nakagami-m Fading*

Jacopo Soffritti (University of Modena and Reggio Emilia & Blekinge Institute of Technology, Italy); Hans-Juergen Zepernick (Blekinge Institute of Technology, Sweden); Maria Luisa Merani (University of Modena and Reggio Emilia, Italy)

This paper presents a performance analysis of randomized distributed space-time codes(RDSTCs) in Nakagami-m fading channels over a multiple Decode-and-Forward (DF) relay network. The performance is analyzed in terms of symbol error probability (SEP) and outage probability (OP). The results of this research provide exact analytical expressions for these two performance metrics. In addiction, the diversity gain of the considered system is derived from these expressions and compared with some results already presented in literature to verify its soundness. Finally, numerical results for some example scenarios are provided to illustrate applications of the derived expressions for performance analysis.

pp. 408-413

08:20 *Energy Detection Sensing of Unknown Signals over Weibull Fading Channels*

Paschalis C. Sofotasios (University of Leeds, United Kingdom); Mulugeta K Fikadu (Tampere University of Technology, Finland); Khuong Ho-Van (HoChiMinh City University of Technology, Vietnam); Mikko Valkama (Tampere University of Technology, Finland)

Energy detection is a widely used method of spectrum sensing in cognitive radio and RADAR systems. This paper is devoted to the analytical evaluation of the performance of an energy detector over Weibull fading channels which have been shown to provide accurate characterization of multipath fading in the frequency range 800/900 MHz. A novel analytic expression is derived for the corresponding average probability of detection over Weibull fading channels. This expressions has a simple algebraic representation which renders it convenient to handle both analytically and numerically. As expected, the performance of the detector appears to be highly dependent upon the severity of fading as even small variation of the fading conditions affect significantly the value of the average probability of detection. The offered results are particularly useful in evaluating the effect of fading in energy detection-based cognitive radio communication systems and therefore they can be used in quantifying the associated trade-offs between sensing performance and energy efficiency in cognitive radio networks.

pp. 414-419

08:40 *Analytic Results for Efficient Computation of the Nuttall−Q and Incomplete Toronto Functions*

Paschalis C. Sofotasios (University of Leeds, United Kingdom); Khuong Ho-Van (HoChiMinh City University of Technology, Vietnam); Tuan Dang Anh (HoChiMinh City University of Technology, Vietnam); Hung Dinh Quoc (HoChiMinh City University of Technology, Vietnam)

This work is devoted to the derivation of novel analytic results for special functions which are particularly useful in wireless communication theory. Capitalizing on recently reported series representations for the Nuttall Q-function

and the incomplete Toronto function, we derive closed-form upper bounds for the corresponding truncation error of these series as well as closed-form upper bounds that under certain cases become remarkably accurate representations. The derived expressions are tight and their algebraic representation is rather convenient to handle analytically and numerically. Given that the Nuttall-Q and incomplete Toronto functions are not built-in in popular mathematical software packages, the proposed results are particularly useful computing these functions when employed in applications relating to natural sciences and engineering, such as wireless communication over fading channels.
pp. 420-425

09:00 *Performance of 16QAM over Rayleigh Fading in the presence of Non Gaussian Noise*

Thinh Vo (POsts and Telecommunications Institute of Technology, Vietnam); Huu Tue Huynh (International University, HCMC VNU, Vietnam)

This paper studies the performance of 16QAM over Rayleigh fading channel in the presence of Additive Non-Gaussian noise which is modeled as a combination of a white Gaussian process and a shot noise process. A simple approach to estimate the amplitude of fading channel is also presented. Simulation results show that for high SNR region, the system is highly affected by the impulsive noise; for low SNR region, white Gaussian noise dominates. Finally, it is shown that the system performance is strongly influenced by two parameters: the average number of impulsive noise occurring during the detection interval and the ratio of the power of impulsive noise to Gaussian noise.
pp. 426-430

09:20 *Combined Generalized Space Shift Keying and Amplitude/Phase Modulation for High-Rate Data Transmission*

Thu Phuong Nguyen (Le Quy Don Technical University, Vietnam); Nam Xuan Tran (Le Quy Don Technical University, Vietnam); Minh Tuan Le (Hanoi Department of Science and Technology, Vietnam)

This paper proposes a novel combined spatial and amplitude-phase modulation (APM) scheme based on the generalize space shift keying (GSSK) system. The so-called GSSK/APM scheme performs two independent modulations using the GSSK and APM constellations. The modulated symbols from the two modulators are multiplied to generate the transmit symbols. With the two different constellations the proposed scheme allows easy control of the spectral efficiency compared to the related multiple antenna systems. In order to detect the transmit symbols, three detectors based on maximum likelihood, linear detection, and correlation are proposed. Theoretical upper bound of the bit error probability (BEP) is also derived and used to validate the simulation results.
pp. 431-436

09:40 *Novel Direction Finding Algorithm Based On Phase Locked Loop With Low Computational Complexity*

Van Yem Vu (Hanoi University Of Science and Technology & School of Electronics and Telecommunications, Vietnam); Han Thanh (Hanoi University of Science and Technology, Vietnam); Tran Ngoc Ha (Hanoi University of Science and Technology, Vietnam)

Radio Direction Finding (DF) is a technique that identifies the bearing angle or the coordinates of an incoming radio signal(s). In this paper, we propose a method for DOA estimation with low computation complexity that is based on the differential phase of signal received by an M-element uniform circular antenna array with a commutative switch followed by single channel Software Defined Radio (SDR) receiver. This method utilizes a bank of Phase Locked Loops (PLLs) to estimate the phase values at each antenna element. These estimated phase values are then fed into a signal processing block that estimates the DOA of the received signal. Analysis of the challenges of computation complexity in this algorithm is presented and then an improvement for reducing computation complexity is developed. The simulation results for DOA estimation using the proposed structure are shown to verify the performance of the system.
pp. 437-442

M3: Microwave & Antennas 3

Room: Hue
Chair: Yoshihide Yamada (National Defense Academy, Japan)
08:00 *A Compact CPW-fed C-shaped Patch Antenna For Wireless Communication*

Hien Chu-Ba (Chuo University, Tokyo, Japan & Shirai Lab, Japan); Hiroshi Shirai (Chuo University, Japan)

In this paper, a compact antenna for broadband operation is depicted. A C-shaped patch that based on Chuo University's logo is used to design a monopole radiator. Transmission line theory and the resonator model are adopted to analyze the operating frequencies of the proposed antenna. The bandwidth was enhanced by using the curve of C-shaped patch and CPW feeding method. The proposed antenna was designed and simulated successfully by using HFSS 14. The simulation results show that the antenna has compact size 18.6×17.2 mm2, a good impedance band with range from 3.9 to 7.6 GHz for return loss S11 less than -10 dB. The simulated bandwidth reaches 3.7 GHz which is about 72.5% with respect to the center frequency of 5.1 GHz. The antenna can be integrated into wireless communication products such as HIPERLAN/2, IEEE 802.11 a/h/j/n, and WiMAX (4.9-5.85GHz).
pp. 443-446

08:20 *Bandwidth enhancement of a circularly polarized printed monopole antenna*

Takafumi Fujimoto (Nagasaki University, Japan); Kozo Jyono (Nagasaki University, Japan)

In authors' previous studies, a printed rectangular monopole antenna for circular polarization has been proposed. The simulated bandwidth of 3dB-axial ratio with 10dB-return loss is approximately 53%. In order to enhance the bandwidth further, in this paper, a printed monopole antenna installing a slot with a T-shaped element in a rectangular patch and installing two T-shaped slits in a ground plane is proposed. By simulations, the effects of the slot in the patch and slits in the ground plane on the axial ratio and the gain are clarified. Moreover, operational principles of circularly polarized wave are clarified by the electric current distributions. According to the parametric studies, a wideband circularly polarized

printed monopole antenna is designed. The bandwidth of 3dB-axial ratio with 10dB-return loss of the proposed antenna is approximately 90%. The gain at high elevation angle is stable within the frequency range.
pp. 447-450

08:40 *Novel High Gain and Broadband CPW-Fed Antennas With EBG for ITS Applications*

Van Yem Vu (Hanoi University Of Science and Technology & School of Electronics and Telecommunications, Vietnam); Bernard Journet (ENS de Cachan, France); Van Chi Pham (Hanoi University of Science and Technology, Vietnam); Vo Tien Tu (Hanoi University of Science and Technology, Vietnam); Nguyen Van Duc (HUST, Vietnam); Pham Van Tien (HUST, Vietnam); Duc Nguyen (Laboratory IMEP-LAHC, Grenoble INP-Minatec, France)

We propose in this paper a novel high gain coplanar waveguide-fed antenna, in which a wide bandwidth is achieved by adjusting taper numbers and slot shape. The proposed compact antenna utilizes the advantages of the CPW line to simplify the antenna structure into a single metallic level, which makes easier the integration with the microwave integrated circuits. To enhance antenna operation in term of gain and bandwidth as well as to control far-field radiation patterns, the initial CPW-fed antenna is with an array of EBG structures in three different ways. Based on this design procedure, proposed antennas are designed, optimized, compared as well as fabricated on low cost material substrate (FR-4, ε=4.4, h=1.6mm). The experimental result of these antennas at 915 MHz and 5.8 GHz band has a measured impedance bandwidth of 5% and 14.6%, a simulated gain of 5.56 dBi and 5.9 dBi, respectively. These properties make the antennas suitable for UHF RFID applications and Dedicated Short Range Communication (DSRC) in Intelligent Transport System.
pp. 451-456

09:00 *Compact Metamaterial CPW-fed WLAN Antenna*

Dang Nhu Dinh (Hanoi University of Science and Technology, Vietnam); Huynh Nguyen Bao Phuong (Hanoi University of Science and Technology, Vietnam); Nguyen Khac Kiem (Hanoi University of Science and Technology, Vietnam); Tran Minh Tuan (Ministry of Information and Communications, Vietnam); Loan Pham-Nguyen (Hanoi University of Science and Technology & School of Electronics and Telecommunications, Vietnam); Chien Ngoc Dao (Hanoi University of Science and Technology, Vietnam)

A novel compact metamaterial antenna for wireless area local network (WLAN) applications is proposed in this paper. The antenna is fed by a co-planar waveguide (CPW). Size reduction of the antenna is achieved thanks to the use of a modified conventional composite right/left handed (CRLH) model without vias. As a result, the antenna demonstrates a good size reduction in comparison with the conventional patch antenna resonating at 2.4 GHz. In order to investigate the merits of proposed model, both antennas are simulated and fabricated. Experimental results show a good agreement between the simulated and measured parameters.
pp. 457-460

09:20 *W-band Phase Measurement of Reflected Wave from Diode Grid for Reflectarrays*

Naruto Yonemoto (Electronic Navigation Research Institute, Japan); Akiko Kohmura (Electronic Navigation Research Institute, Japan); Shunichi Futatsumori (Electronic Navigation Research Institute, Japan)

Foreign Objects and Debris (FOD) must be removed from runways. Under the necessity of automatic continuous survey, we are investigating a new FOD detection system based on millimeter wave radar system connected by Radio-over-Fiber lines. This RoF radar project is also interested in a beam steering antenna such as phased array antennas. This paper describes a concept of diode grid reflector antenna. We introduce a concept of the antenna. And we also introduce a phase evaluation system to measure the phase of reflected wave from the circuit boards in W band. The validity of the system is confirmed to compare between simulation and measurement. Moreover, we measured diode test boards to change the phase of reflected wave. As the results, we find the possibility to change the reflection phase using switching diode.
pp. 461-464

09:40 *Ku Band Aperture-Coupled C-Patch Reflectarray Element using Phase Shifting Line Technique*

Kien Trung Pham (Ho Chi Minh City International University, Vietnam); Nguyen Binh Duong (International University, Vietnam); Van-Su Tran (International University, HCMC VNU, Vietnam); Lan Phuong Bui (International University, VNU HCMC., Vietnam); Linh Mai (International University of Viet Nam, Vietnam); Naruto Yonemoto (Electronic Navigation Research Institute, Japan); Akiko Kohmura (Electronic Navigation Research Institute, Japan); Shunichi Futatsumori (Electronic Navigation Research Institute, Japan)

This paper shows experimental validation of a reflectarray element structure based on C-patch coupling through annular slot to circular patch connecting to line of variable length. The range of reflection phase is greater than 360 degrees with a quasi-linear phase curve obtained by adjusting the length of line. The element configuration to work at Ku band, specifically 12 GHz, has brought out dominant results in reflection phase characteristics with acceptable reflection loss. To verify the working principle carried out in simulation, a number of reflectarray element prototypes are fabricated and measured by using waveguide simulator technique.
pp. 465-468

M4: Microwave & Antennas 4 🖼

Room: Saigon
Chair: Nguyen Binh Duong (International University, Vietnam)
08:00 *A Fully Integrated LC VCO with 1V Voltage Supply for Wireless Sensor Network Applications*

Jian Jiang (Southeast University, P.R. China); Xiangning Fan (Southeast University, P.R. China)

A fully integrated LC VCO with 1V low voltage supply, applied in the frequency synthesizer for wireless sensor network applications, is designed and implemented based on TSMC 0.18μm RF/MS CMOS process with low power consumption and

good phase noise performance. To conquer the problems brought by low voltage, the structure of VCO is carefully selected. Besides, switched capacitor array and second harmonic filter technology is taken to widen frequency tuning range and improve phase noise performance respectively. The VCO designed in this paper has good phase noise performance and low power consumption by optimization. The layout area is 850μm×680μm. Post simulation results show that the frequency tuning range is between 4.48~6.52GHz and power consumption of VCO core is between 1.8~4.6mW. At the meanwhile, phase noise is between -106.7~ -117.5dBc/Hz@1MHz.
pp. 469-472

08:20 *An Effective Scattering Model for 3-D Urban Propagation: Application to Moving Target Detection at High-Frequency Bands*

Minh N. T. Nguyen (International University & Vietnam National University - Ho Chi Minh City, Vietnam)

In the present paper, we focus on the design of an effective 3-D modeling for the simulation of urban environment propagation, which integrates the Urban Building Model (UBM), Ray-Tracing (RT) technique and the Uniform Theory of Diffraction (UTD). UBM is an object-oriented data structure, in which each building is an object. Besides that, we also take into account some other urban elements such as car parking, traffic lights... Meanwhile, the RT technique helps us not only to delineate the propagation path but also to explain the interaction mechanism of rays through a complex area. In this work, we use the Shooting and Bouncing Ray (SBR) technique. Last of all, the asymptotic method UTD will be employed in order to calculate the scattered far-field attached to the rays. These rays propagated from the transmitter, after some interactions, mainly reflection and diffraction, inside an urban area, are intercepted by the receiver. This proposed model will be applied at high-frequency bands (X,K). As a consequence, we will evaluate the detection capability of the model for a target, i.e. a car, moving inside a realistic urban area. The simulated results have shown that the model can predict precisely the motion direction of the considered target.
pp. 473-478

08:40 *Novel Ultra-Wideband Bandpass Filter With Notched Band Using Stubs Loaded Multi-Mode Ring Resonator*

MinhTan Doan (Le Qui Don Technical University, Hanoi, Vietnam., Vietnam)

A novel compact microstrip ultra-wideband (UWB) bandpass filter (BPF) with narrow notched band using stepped-impedance open stub and short stub loaded multi-mode ring resonator (MMR) is proposed in this letter. By tuning the length and width of open stub, short stub and ring resonator, the center frequency and bandwidth of the UWB passband can be easily adjusted to the desired value. The narrow notched band was introduced by using a new technique which involves embedding stepped-impedance open stub have wide and narrow parts, which are placed on the symmetrical plane to perturb the ring resonator. The center frequency of the notched band can be controlled by tuning the stepped-impedance open stub. A prototype of UWB with 3 dB fractional bandwidth (FBW) of passband is (2.8-11.05 GHz) about 119%, notched band at 5.4 GHz with the FBW

is 4.6% is designed and fabricated for demonstration, indicating good agreement with the theoretical expectation.
pp. 479-482

09:00 *Novel Design of Hybrid Cladding Hexa-Octagonal Photonic Crystal Fiber with Dispersion Control for Broadband Communication*

Nghiem Tam (Hanoi University of Science and Technology, Vietnam); Yoshinori Namihira (University of the Ryukyus, Japan); Nguyen Hoang Hai (Hanoi University of Science and Technology, Vietnam)

This paper proposes a novel structure for dispersion controlling and low confinement losses with a hybrid core hexagonal-octagonal photonic crystal fiber (6/8-PCF). By including hexagonal rings lattices structure in the cladding region of the conventional O-PCF and adjusting the size of air holes around the two innermost cladding structure, we can successfully design low flattened PCF with low confinement loss. The influence of design parameters on the properties of chromatic dispersion, confinement loss, effective area of the hybrid cladding HO-HPCF is also investigated. The low flattened dispersion feature, as well as the low confinement losses is the main advantages of the proposed PCF structure, making it suitable as chromatic dispersion controller/compensator for broadband communication system.
pp. 483-487

09:20 *The Designs of Transmit/Receive Module for X-Band Navigation System*

Huy Quang Nguyen (Dep. Electrical Engineering and Technology-Institute of System Integration-Le Quy Don Technical Uni, Vietnam)

This paper is concerned with some versions and measurements of the X-Band Transmit/Receive (T/R) module that is a key unit of the active phased array antenna (APAA). In the first version (V1), the transmit chain (TX) is primarily composed of a medium power amplifier and a two-watt-output power amplifier, and the Receive chain (RX) includes a low noise amplifier (LNA), and an attenuator (AT). In the second version (V2), an analog phase shifter is added to the transmit chain (TX), along with a medium power amplifier, as well as temperature and power controlling circuits. In the Receive chain (RX) a phase shifter (PS) and a LNA with voltage gain amplifier (VGA) are added, but the AT is removed. Thanks to this improvement, the T/R module achieved 32dBm minimum P1dBc with 20 dB linear gain in TX, 32 dB linear gain and with 4.8 dB noise figure in RX, with dynamic range of at least 95 dB. With both versions, the focus of mechanical designing is to reduce effects from noise and rising temperature.
pp. 488-491

09:40 *Miniaturized Tri-band Bandpass Filter Using Modified Triple-mode Resonators With Multiple Transmission Zeros*

MinhTan Doan (Le Qui Don Technical University, Vietnam); Nguyen Tran Quang (Le Quy Don Technical University, Vietnam); Le Hai Nam (Le Quy Don Technical University, Vietnam)

A compact microstrip tri-band bandpass filter (BPF) using the modified triple-mode resonators to reduce the size is presented. The center frequencies of the first and the third passband can be conveniently controlled by tuning the dimensions of

the short stub and square ring, whereas the second passband frequency is fixed. Moreover, the filter has been implemented with multi-transmission zeros to improve the selectivity and upper-stopband performance. To verify the proposed approach, a prototype of tri-band BPF centred at 2.4/3.5/5.2 GHz for WLAN/WiMAX applications is designed and fabricated for demonstration, indicating good agreement with the theoretical expectation.
pp. 492-495

10:00 - 10:20

Coffee Break

10:20 - 12:00

C6: Communication 6

Room: Hanoi
Chair: Hung Nguyen-Le (The University of Danang & University of Science and Technology, Vietnam)
10:20 *Packet Timeout Probability for Uplink Spectrum Sharing*
Louis Sibomana (Blekinge Institute of Technology, Sweden); Hung Tran (National Institute of Education Management, Vietnam); Hans-Juergen Zepernick (Blekinge Institute of Technology, Sweden)
In this paper, we consider an uplink spectrum sharing cognitive radio network (CRN). In particular, we assume that N secondary user (SU) transmitters (SU-Txs) communicate with an SU receiver (SU-Rx) in the presence of a single primary link. Under the joint constraint of the primary user (PU) outage probability and SU-Tx maximum transmit power, the SU transmit power policy is obtained. Moreover, the SU-Tx with a minimum transmission time is scheduled for transmission. Accordingly, the cumulative distribution function (CDF) of packet transmission time is derived under independent but not necessary identically distributed (i.n.i.d.) Rayleigh fading channels to evaluate the packet timeout probability. Numerical examples are provided to investigate the impact of the SU transmit power policy, the interference from the PU transmitter (PU-Tx) to the SU-Rx, the number of SU-Tx, and the packet size on the secondary network performance. The results indicate that the packet transmission time can be minimized as the number of SU-Tx becomes large.
pp. 496-500
10:40 *Contention Window Allocation Scheme for V2V*
Gil-Won Lee (Kumoh National Institute of Technology, Korea); Dong Seong Kim (Kumoh National Institute of Technology, Korea)
This paper proposes a contention window (CW) allocation scheme for real-time emergency data for vehicle ad hoc networks. The proposed scheme reduces the probability of packet collisions on vehicle-to-vehicle (V2V) protocol and provides bandwidth efficiency with short delay for emergency sporadic data. In the case of high density traffic, the proposed scheme decreases re-collision probability using

dynamic CW adjustments. Simulation results show that the proposed scheme can enhance network performance in terms of throughput, end-to-end delays, and network loads in the case of highway traffic.
pp. 501-505

11:00 *A Novel Low Complexity Maximum Likelihood Detection Algorithm for MIMO WLAN System*

Thi Hong Tran (Kyushu Institute of Technology, Japan); Yuhei Nagao (Radrix co. ltd, Japan); Hiroshi Ochi (Kyushu Institute of Technology, Japan)
In this paper, we propose a novel efficient algorithm for the maximum likelihood detection (MLD) in MIMO WLAN systems. According to our algorithm, the In-phase and the Quadrature-phase components of a complex signal are processed independently on the real domain. Whereby, the algorithm is able to determine the closest constellation points directly without searching all of the constellation points and sorting all of the calculated values as the well-known K-Best sphere decoding (KSD) does. Consequently, its complexity becomes insignificantly affected by the size of the constellation. Applying the proposed algorithm in the IEEE 802.11 ac system, the Bit Error Rate (BER) performance and the complexity are exposed and compared with the other MIMO decoder types such as LMMSE, BLAST-MMSE, LRA-MMSE, and especially with the KSD. The paper shows that the proposed algorithm significantly reduces the complexity with an insignificant degradation of BER performance as compare to the KSD.
pp. 506-510

11:20 *The Design of Sum-of-Cisoids Channel Simulators Using the Iterative Nonlinear Least Square Approximation Method*

Akmal Fayziyev (University of Agder, Norway); Matthias Pätzold (University of Agder, Norway)
In this paper, we propose the iterative nonlinear least square approximation (INLSA) algorithm as an effective method for the design of sum-of-cisoids (SOC) channel simulators assuming non-isotropic scattering conditions. For the characterization of non-isotropic scattering scenarios, we use the von Mises distribution for describing the distribution of the angles-of-arrival (AOAs). The INLSA method relies partially on numerical optimization techniques. This method determines the SOC model parameters iteratively by minimizing the Frobenius error norm. We evaluate the performance of the INLSA method and compare the result with those obtained for the Riemann sum method (RSM) and the Lp-norm method (LPNM). The performance comparisons will be carried out with respect to the autocorrelation function (ACF) and the distribution of the envelope. The obtained results indicate that the proposed method is more preferable than the RSM and the LPNM when emulating the statistical properties of the channel under non-isotropic scattering conditions. In addition to its efficiency and excellent performance, the simplicity of the INLSA makes the method a powerful tool for designing channel simulators required for the test and evaluation of mobile communication systems.
pp. 511-515

11:40 *Relay Selection based on Bayesian Decision Theory in Cooperative Wireless Networks*

Lilatul Ferdouse (Ryerson University, Canada); Alagan Anpalagan (Ryerson University, Canada); Jeeva Nadaraj (Pesiplex Inc., Canada)
In cooperative wireless networks, proper relay selection is needed for assuring maximum diversity gain. In other words, user relaying helps to improve the transmission performance in wireless multiuser scenario by allowing each user to cooperate with each other and acts as a MIMO system by sharing their antennas in a timely and distributed way. Among several challenges in such networks, this paper focuses on the selection problem of relay node, and then we propose a scheme to select relay nodes by using Bayes theory. In this schema, at first each source node calculates prior and class conditional probability based on the channel state information and then relay nodes are selected based on the posterior probability of each source and relay node pair, which is estimated by applying Bayes theorem. The proposed relay assignment schema maximizes the overall data rate of the networks and it works well independent of the number of relay nodes or source-destination pairs in the network.
pp. 516-520

E3: Electronics 3

Room: Hue
Chair: Minh Cuong Huynh Phu (Ho Chi Minh City University of Technology, Vietnam)
10:20 *A Novel 10bit 90MS/s 2b/cycle SAR ADC*
Hualing Wu (Southeast University, P.R. China); Qiao Meng (Southeast University, P.R. China); Hao Zhi (Southeast University, P.R. China)
A 10-bit 90MS/s Successive Approximation Register (SAR) analog-to-digital converter (ADC) is realized in TSMC 0.18μm CMOS process. With 2b/cycle technique and new proposed asynchronous control logic, the proposed SAR ADC achieves rapid conversion rate, low power, leading to SNDR of 55.3 and SFDR of 64.7 at 90MS/s with 43M input. The active area with the digital calibration is 0.6x0.8mm2.
pp. 521-524
10:40 *Design and Implementation of Versatile Live Multimedia Streaming for IP Network Camera*
Phuoc Pham (Soongsil University, Korea)
In this paper, we propose design and implementation of versatile live Multimedia streaming for DM36x-based IP network camera which can support not only streaming of existing various video formats (H.264, MPEG4, MJPEG) in many sizes and audio formats (AAC, PCM) but also streaming of MPEG2-TS. Current IP network cameras supports live video and audio streaming through separate channels so that it is not easy to achieve video/audio synchronization at clients. MPEG2-TS is an international standard for video/audio synchronization and many open source or free multimedia players usually recognize and support to play MPEG2-TS. The proposed implementation for IPNC in this paper utilizes LIVE555 of the open source multimedia streaming framework for its live video/audio streaming. For the implementation of MPEG2-TS streaming, we first modify some of the current live video/audio streaming S/W components, and

MPEG2-TS related classes of LIVE555, and then integrate them together. In addition to MPEG2-TS live streaming, the proposed system is also flexibly constructed so that it can support other multimedia live streaming such as H.264, MPEG4, MJPEG, AAC and {H.264, MPEG4, MJPEG} with audio as well in the same process. The proposed implementation of live MPEG2-TS is shown to achieve lip sync reasonably well in real-time by performing a VLC player at a client side.
pp. 525-530

11:00 *Optimum Input Two-Port for Stabilisation of Transistors*

Binh Le (Vietnamese German University, Vietnam); Tung Tran (Vietnamese German University, Germany); Gernot Zimmer (Vietnamese German University, Vietnam)
In this paper a two step process is described to find an optimum input two-port to stabilise a transistor under the constraint of minimising the additionally introduced mean gain degradation. The method is successfully applied to four gallium nitride rf-power transistors of different nominal saturation power.
pp. 531-534

11:20 *An Efficient ASIC Implementation of Logarithm Approximation for HDR Image Processing*

Van-Phuc Hoang (Le Quy Don Technical University, Vietnam); Do Xuan Tien (Le Quy Don Technical University, Vietnam); Pham Cong-Kha (The University of Electro-Commununication, Japan)
This paper presents an efficient ASIC implementation for hardware approximation of the logarithm function which can be used for emerging high dynamic range image processing applications. By employing a new logarithm approximation method, the modified barrel shifter circuit and optimized leading one detector and encoder, the proposed approach can reduce the hardware area and improve the logarithm computation speed significantly while achieve the similar accuracy compared with other methods. The implementation results in 0.18-um CMOS technology are also presented and discussed.
pp. 535-539

11:40 *Towards Residential Smart Grid: A Practical Design of Wireless Sensor Network and Mini-Web Server Based Low Cost Home Energy Monitoring System*

Minh-Thanh Vo (International University, Vietnam); Huu Tue Huynh (International University, HCMC VNU, Vietnam); Thong Le Chi (Ho Chi Minh University of Technology, Vietnam); Tuan-Duc Nguyen (International University, HCMC VNU, Vietnam)
Power grid is concurrently reaching its limitations, smart-grid technology will be necessary in the near future to increase efficiency, reliability of electricity infrastructure. Wireless sensor network (WSN) is a potential solution to develop smart grid system in residential area. In this paper, we describe a WSN and mini-Web Server based low cost energy monitoring system which enables residents monitor and control their domestic energy consumption of appliances to minimize their overall energy cost. Real time power consumption data of home area systems can be accessed by energy provider; based on this data, online pricing can be applied reduce Peak to Average Ratio of energy consumption. The system can

support the development of smart grid which delivers electricity from suppliers to consumers based on two-way communications. The advantage of our system is low cost design by using mini-web server and low cost transceiver modules.
pp. 540-545

S4: Signal Processing 4

Room: Saigon
Chair: Thuong Le-Tien (Hochiminh city University of Technology, Vietnam)
10:20 *Temporal Confusion Network for Speech-based Soccer Event Retrieval*
Nhut Pham (University of Science, Vietnam); Quan Vu (University of Science, Vietnam)
This paper introduces temporal confusion network and its application for speech-based soccer event retrieval, where an event is remarked by the announcer's spoken words. A temporal confusion network is a confusion network in which each cluster is marked with temporal information. Since the purpose of soccer event retrieval is to retrieve only the interesting highlights - not the whole video clip, temporal information is crucial in tracking them. By expanding the indexing model from 1-best transcriptions to temporal confusion networks, recall rates for event retrieval can be improved. Experiments are conducted on the first round of World Cup 2010 and the Vietnamese AFF Suzuki-cup 2008 databases. In the best case, an average improvement of 7.1% recall rate is achieved.
pp. 549-553
10:40 *Contributions to the Fundamentals of Magnetohydrodynamics via the Classical Mathematical Equations*
Le Chi Kien (Ho Chi Minh City - University of Technical Education, Vietnam)
From the basic concepts, the Magnetohydrodynamics (MHD) and the electrodynamics are very closed, therefore the aim of this paper is to develop all the conventional electrodynamics laws for analysing the effect and electrical charateristics in the MHD. The Lorentz force, Ohm's law, Ampere's law and Faraday's law have been considered and they are closely related to each other, however, the Faraday's law seems to be the most important in MHD. All the essential parameters have been developed and shown their relations and can be used for deeper study of MHD.
pp. 554-558
11:00 *Archery Sight-System by Magnetic Sensors for Visually Impaired Persons*
Ikuo Oka (Osaka City University, Japan); Takuya Sasayama (Osaka City University, Japan); Shingo Ata (Osaka City University, Japan); Thi Thi Zin (Osaka City University, Japan); Hitoshi Watanabe (Osaka City University, Japan); Hiroshi Sasano (Kinki University, Japan)
The archery sight-system is developed for visually impaired persons. The system is based on the magnetic directional sensors for earth magnetism. Both azimuth and elevation angles to the target are measured by the sensor equipped on the archery bow. The sensed information is transmitted to the receiver, which is located near the archer. The sound interface in the receiver transforms the sensed information to the hearing information, and the archer gets this hearing

information by the wireless headphone. The sensor system is light-weight of 34g, and operates for about 2 hours by two SR44 button batteries. Shooting experiments by archers with eye-mask show that the system is useful for the visually impaired persons to play archery.

pp. 559-562

11:20 *Frame Background Influence Based Invisible Watermarking to Visible Video Watermarking*

Ta Minh Thanh (Tokyo Institute of Technology, Japan); Pham Thanh Hiep (Yokohama National University, Japan)

In this paper, we propose a novel watermarking scheme where both visible and invisible watermarking are embedded into video sequences. Our invisible watermarking is implemented based on the influence of background after embedding the visible watermarking by the adaptive cross correlation (ACC) method. By doing so, our method can be used to achieve two purposes: 1) to announce the ownership of video and 2) to distinguish the legal user. Experimental results showed that our proposed method is suitable for digital e-commerce business and is robust against slight geometrical attacks and video processing attacks.

pp. 563-568

11:40 *Pseudo Correlation Function Based Ambiguity Mitigating Technique for Cosine-Phased BOC Signals*

Jie Long (University of Science and Technology of China (USTC), P.R. China); Canmei Yang (University of Science and Technology of China, P.R. China); Fujiang Lin (USTC, P.R. China)

Binary offset carrier (BOC) modulated signals are widely used in the new global navigation satellite system (GNSS). These signals improve tracking accuracy and provide better resistance to multipath and narrowband interference. However, these advantages come at a price, namely the ambiguity problem in acquiring and tracking. In this paper, a novel ambiguity mitigating technique is proposed for arbitrary cosine-phased BOC signals. This technique is based on a pseudo correlation function (PCF) which has a sharp main peak and only two small positive side peaks, thus removes most of the false lock points on the discriminator output compared with conventional BOC tracking techniques. Theoretical and simulation results show that this technique also has a good performance of multipath mitigation.

pp. 569-573