

International Conference on Communication Systems and Networks – ComNet16

July 21 – 23, 2016

Programme & Compendium of Abstracts

Jointly organized by

Department of Electronics and Communication Engineering,
Mar Baselios College of Engineering & Technology, Trivandrum, India
and

University of Dayton, USA

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WELCOME ADDRESS

It is with great pleasure I invite you to participate in the 2016 International Conference on Communication Systems and Networks(ComNeT2016), which will be held in Trivandrum from 21-23July 2016. The conference is organized by Department of Electronics and Communication Engineering, Mar Baselios College of Engineering and Technology, Trivandrum, jointly with University of Dayton, USA, and is technically sponsored by IEEE.

With the advances in Technology, the world has become small in size, giving us a feeling of living together irrespective of the geographical distances that separate us. Communication Systems and Networks have played a significant role in the dissemination of information giving the users an enriching experience providing access to a world of integrated services. In addition, design and development of novel Signal Processing Algorithms has been critical in the advancement of Communication Systems towards a number of industrial, medical and scientific applications. Thus the Conference will focus on three main areas, Communication, Signal Processing and Networks.

We sincerely hope that the scope of the conference will serve the interest of the scientific community, industry and the society. Moreover, the conference will serve as a platform for the participants to get in touch with their peers who share similar research interest.

I extend a hearty welcome to all the participants and sponsors of ComNeT2016.

Dr T. M. George,
Conference General Chair

PROGRAMME OVERVIEW

The Department of Electronics and Communication Engineering, Mar Baselios College of Engineering and Technology (MBCET), Nalanchira, Thiruvananthapuram is organizing International Conference on Communication Systems and Networks (ComNet16) jointly with University of Dayton, USA, with the participation of well known and leading personalities in the relevant fields from India and abroad from July 21 to 23, 2016 at MBCET campus. The conference is technically sponsored by IEEE.

The conference includes a technical programme consisting of parallel tracks of submitted papers in the broad areas of Communication, Signal Processing & Networks. There will be invited talks by experts from leading research institutions from India and abroad who will be enlightening the audience on various themes related to the applications and current practices in Communication Systems and Networks.

Leading researchers working in related fields from different reputed institutions from India and abroad will be presenting their research findings during the three days of the conference. The conference will conclude with a panel discussion on the current and future trends in related areas.

On behalf of Mar Baselios College of Engineering & Technology, I wish all the participants a fruitful, enriching and enjoyable experience over these three days.

Jayashree M.J.,
Organizing Chair.

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KSCSTE an autonomous Institution of Govt. of Kerala is committed for the promotion of Science, Education, Research and Scientific temper in the State. KSCSTE prepares the road map for development of the State through advancements in scientific research and innovation in technologies. Achieving excellence in basic research, academia-industry interactions, strengthening indigenous technologies initiatives, and building strong infrastructure and developing a high quality science education system in the state are our targeted goals. There are Eight R&D centres under the umbrella of the Council to coordinate Research and Development activities in the specific mandated domains.

- Jawaharlal Nehru Tropical Botanical Garden & Research Institute (JNTBGRI), Palode
- Centre for Water Resources Development & Management (CWRDM), Kozhikode
- Kerala Forest Research Institute (KFRI), Thrissur
- National Transportation Planning & Research Centre (NATPAC), Thiruvananthapuram
- Kerala School of Mathematics, Kozhikode
- SrinivasaRamanujan Institute for Basic Sciences (SRIBS), Kottayam
- Malabar Botanical Garden & Institute of Plant Sciences (MBG& IPS), Kozhikode
- Kerala State Centre for Assistive Technologies (KSCAT)

The major Schemes & Programmes of Council headquarters, located in the State Capital, Thiruvananthapuram are as follows:

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- KSCSTE Research Fellowships
- Post-Doctoral Fellowships
- Emeritus Scientist Scheme for senior Scientists
- Fellowships in Science writing & Science Communication
- Prathibha Scholarships for Students opting Science learning
- Kerala Shastra Puraskaram for eminent scientists
- Kerala Science Literature Award

FINANCIAL GRANT FOR RESEARCH PROJECTS

- Science Research Scheme
- Engineering & Technology Programme
- Ecology & Environment Programme
- Individual and collaborative projects in Engineering & Environment areas
- Intensive programmes for Innovators of Rural Technology and Biotechnology
- SARD Scheme focusing activity specific areas
- Technology Development and Adaptation Programme

PROMOTIONAL PROGRAMMES

- Kerala Science Congress
- Back to Lab Programme for Women
- Vocational skill oriented reinstated training
- Tech Fest, Green Corps, Eco Clubs
- Sasthraposhini & Sasthra Bhodhini
- SPYTIS Project for School and College Students
- Patent Information Centre
- Scientific Management Training
- Rural innovators Meet

POPULARISATION PROGRAMMES

- *Science Popularization Programmes*
- *Support for Seminar, Symposia and Workshop*
- *National Science Day, National Technology Day, World Environmental Day, Ozone Day etc*

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KEYNOTE SPEECH

Dr. Vijayan K. Asari,

Professor in Electrical and Computer Engineering,
University of Dayton

Biographical Sketch: Dr. Vijayan Asari is a Professor in Electrical and Computer Engineering and Ohio Research Scholars Endowed Chair in Wide Area Surveillance at University of Dayton, Dayton, Ohio. He is the director of the University of Dayton Vision Lab (Center of Excellence for Computer Vision and Wide Area Surveillance Research). Dr. Asari had been a Professor in Electrical and Computer Engineering at Old Dominion University, Norfolk, Virginia till January 2010. He was the founding director of the Computational Intelligence and Machine Vision Laboratory (ODU Vision Lab) at ODU.

Dr. Asari received the Bachelor's degree in electronics and communication engineering from the University of Kerala (College of Engineering, Trivandrum), India, in 1978, the M. Tech and Ph. D degrees in electrical engineering from the Indian Institute of Technology, Madras, in 1984 and 1994 respectively.

Dr. Asari had been working as an Assistant Professor in electronics and communications at TKM College of Engineering, University of Kerala, India. In 1996, he joined the National University of Singapore as a Research Fellow and led a research team for the development of a vision-guided microrobotic endoscopy system. He joined the School of Computer Engineering, Nanyang Technological University, Singapore in 1998 and led the computer vision and image processing related research activities in the Center for High Performance Embedded Systems at NTU.

Dr. Asari received several teaching, research, advising and technical leadership awards. He received the Outstanding Teacher Award from the Department of Electrical and Computer Engineering in April 2002 and the Excellence in Teaching Award from the Frank Batten College of Engineering and Technology in April 2004. He also received the Outstanding Researcher Award from the Department of Electrical and Computer Engineering and the Excellence in Research Award from the Frank Batten College of Engineering and Technology, both in April 2006. Dr. Asari received the Faculty Advising Award and the Certificate of Excellence for Promoting Undergraduate Research from Old Dominion University, both in 2009. He received the Outstanding Engineers and

Scientists Award for Technical Leadership from The Affiliate Societies Council of Dayton in April 2015 and the Sigma Xi George B. Noland Award for Outstanding Research in April 2016.

Dr. Asari has published more than 500 research articles including 85 peer-reviewed journal papers co-authoring with his graduate students and colleagues in the areas of image processing, computer vision, pattern recognition, machine learning, and high performance digital system architecture design. He has supervised 22 PhD dissertations and 35 MS thesis in electrical and computer engineering. Currently several Masters and Doctoral level graduate students are working with him. Dr. Asari was awarded two United States patents in 2008 with his former graduate students and another patent in 2013 with his former colleagues.

Dr. Asari has been a Senior Member of the IEEE since 2001 and is a Senior Member of the Society of Photo-Optical Instrumentation Engineers (SPIE). He is a member of the IEEE Computational Intelligence Society (CIS), IEEE CIS Intelligent Systems Applications Technical Committee, IEEE Systems, Man and Cybernetics Society (SMC) Technical Committee of Human Perception in Vision, Graphics and Multimedia, IEEE Internet of Things (IoT) Community, Society for Imaging Science and Technology (IS&T), IS&T Data Analytics and Marketing Task Force, Institute for Systems and Technologies of Information, Control and Communication (INSTICC), and American Society for Engineering Education (ASEE). Dr. Asari is the co-organizer of several SPIE and IEEE conferences and workshops.

Topic: Wide area aerial surveillance for situation awareness and security automation

Abstract: Wide area surveillance refers to an automated monitoring process that involves data acquisition, analysis, and interpretation for understanding object behaviors. Automated surveillance systems are mostly used for military, law enforcement, and commercial applications. Intelligent visual surveillance is also becoming more popular in applications such as human identification, activity recognition, behavior analysis, anomaly detection, alarming, etc. The rapidly growing field of wide area surveillance involves data acquisition and processing of video captured from long range and wide viewing angle sensors. Aircrafts, many times unmanned, flying at very high altitude capture high resolution data of the ground below. Today's camera technology can capture frames with Giga-pixel resolution at a rate of 60 frames per second. As camera

capabilities continue to improve, higher resolution data will be captured at faster rates. The data is captured from high altitudes and therefore that may cover hundreds of square miles within its field of view.

Detection, tracking, and identification of moving objects in a wide area surveillance environment have been an active research area in the past few decades. Object motion analysis and interpretation are integral components for activity monitoring and situational awareness. Real-time performance of these data analysis tasks in a very wide field of view is an important need for monitoring in security and law enforcement applications. Although huge strides have been made in the field of computer vision related to technology development for automatic monitoring systems, there is a need for robust algorithms that can perform detections of objects and individuals in a surveillance environment. This is mainly because of certain constraints such as partial occlusions of the body, heavily crowded scenes where objects are very close to each other, etc. We present a robust automated system which can detect and identify people by automated face recognition in a surveillance environment and track their actions and activities by a spatio-temporal feature tracking mechanism.

Research in autonomous detection of machinery threats on oil and gas pipeline right-of-ways (ROWs) in wide area imagery is an important task to protect our pipeline infrastructure. A great amount of effort is required for human analysts to identify threats manually in thousands of images captured by small aircrafts or Unmanned Aerial Vehicles (UAVs). Therefore, there is a need for a full-fledged intrusion detection system to automate this process. In order to provide robust monitoring of threats or intrusions to pipeline ROWs, the technology should be capable of addressing the challenges due to image resolution, sensor noise, lighting conditions, partial occlusions, and various heights and viewing angles between the objects and sensors. We present an automatic object detection system that can detect potential threat objects on pipeline ROWs to aid the human analysts for threat evaluation and subsequent actions. Our real-time automated airborne monitoring system can detect, recognize, and locate machinery threats such as construction equipment entering the pipeline ROWs.

TECHNICAL PROGRAMME

THURSDAY, 21 JULY 2016

Session	:	Invited Talk
Title	:	The Evolution of WiFi: From Fighting Microwaves to the Internet of Things
Speaker	:	Dr. Krishnaraj M. Varma Senior Hardware Engineer, Hughes Network Systems, Germantown, Maryland, USA
Time	:	11.30 -12.30am
Venue	:	Senatus Hall

Session	:	Invited Talk
Title	:	Planar Antennas – Essentials
Speaker	:	Dr.S. Raghavan, Professor, Dept. of ECE, NIT–Trichy
Time	:	2.00pm- 3.00pm
Hall	:	Senatus Hall

Session	:	T1-S2
Theme	:	Communication Networks -I
Time	:	3.20pm –4.20pm
Hall	:	Senatus Hall

S2-A1	84 - Worm Hole-Black Hole attack Detection and Avoidance in Manet with Random PTT using FPGA
S2-A2	88 - Frequency offset estimation of Wimax using repeated preamble
S2-A3	100 - Comparative Analysis of Offset Estimation Capabilities in Mathematical Sequences for WLAN

Session	:	T2-S2
Theme	:	Image Processing-I
Time	:	3.20pm – 4.20pm
Hall	:	Aryabhatta Hall

S2-B1	27 - Multimodal Face Recognition using Spectral Transformation by LBP and Polynomial Coefficients
S2-B2	96 - Single Shot High Dynamic Range Imaging using Power Law Transformation and Exposure Fusion
S2-B3	123 - Multi-focus Color Image Fusion using NSCT and PCNN

FRIDAY, 22 JULY 2016

Session	:	Keynote Address
Title	:	Wide area aerial surveillance for situation awareness and security automation
Speaker	:	Dr. Vijayan K. Asari Professor in Electrical and Computer Engineering, University of Dayton
Time	:	9.30am – 10.30pm
Hall	:	Senatus Hall

Session	:	Invited Talk
Title	:	LTE in Unlicensed Band: Opportunities & Challenges
Speaker	:	Dr. Sriram N. Kizhakkemadam Senior Chief Engineer, Samsung R&D Institute, Bangalore
Time	:	11.00am – 12.00pm
Hall	:	Senatus Hall

Session	:	T1-S3
Theme	:	Microwave Communication-I
Time	:	12.10pm – 1.10pm
Hall	:	Senatus Hall

S3-A1	116 - Compact Multiband Microstrip Patch Antenna For Wireless
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	Applications
S3-A2	91 - Design and Development of a Dual Directional Coupler with Transformers for HF band applications
S3-A3	78 - Compressive beamforming using greedy algorithms.

Session	:	T2-S3
Theme	:	Image Processing-II
Time	:	12.10pm – 1.10pm
Hall	:	Aryabhata Hall

S3-B1	89 - 3D Face Reconstruction by Pose Correction, Patch Cloning and Texture Wrapping
S3-B2	109 - Spatial Resolution Enhancement Of Hyperspectral Image By Negative Abundance Oriented Spectral Unmixing
S3-B3	119 - Wavelet-Based Marker Controlled Watershed Transformation

Session	:	T2-S3
Theme	:	SpeechProcessing
Time	:	12.10pm – 1.10pm
Hall	:	Faraday Hall

S3-C1	48 - Estimation of Vocal Tract Shape of Vowels for Children
S3-C2	141 - Performance Analysis of CELP Codec for Gaussian and Fixed Codebooks
S3-C3	161 - Audio Watermarking Technique using Modified Discrete Cosine Transform

Session	:	T2-S4
Theme	:	Biomedical Signal Processing-I
Time	:	2.00pm –3.20pm
Hall	:	Senatus Hall

S4-A1	121 - Myocardial Infarction Detection Using Hybrid BSS Method
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S4-A2	130 - Advanced Earlier Melanoma Detection Algorithm Using ColourCorrelogram
S4-A3	163 - An Accurate Method of Breast Cancer Detection from Ultra Sound images Using Probabilistic Fuzzy Clustering Algorithm
S4-A4	134 - A Robust Video Denoising System Using OptimisedSurfacelet Transform

Session	:	T2-S4
Theme	:	Biomedical Signal Processing-II
Time	:	2.00pm –3.20pm
Hall	:	Aryabhatta Hall

S4-B1	54 - Blood Vessel Segmentation In Fundus Images And DetectionOf Glaucoma
S4-B2	87 - ROI Lossless Colored Medical Image Watermarking Scheme with Secure Embedding of Patient Data
S4-B3	126 - Advanced Algorithm for Polyp Detection Using Depth Segmentation in Colon Endoscopy
S4-B4	153 - Multistructure Brain Registration Using Multimodal Neuroimaging for the Detection of Alzheimer's Disease

Session	:	T1-S5
Theme	:	Multicarrier Communication-II
Time	:	3.40pm –4.40pm
Hall	:	Senatus Hall

S5-A1	69 - Determination of Propagation Constant Using 1D-FDTD with
S5-A2	166 - Design of L Band Cavity Filter for GPS Receiver
S5-A3	74 - Analysis of Mode of Propagation in Substrate Integrated Waveguide Using FDTD

Session	:	T2-S5
Theme	:	Image Processing-III
Time	:	3.40pm –4.40pm
Hall:	Aryabhata Hall	

S5-B1	67 - Robust Multiview Registration of Point Clouds
S5-B2	86 - Face Recognition and Authentication using LBP and BSIF
S5-B3	136 - Facial expression recognition and gender classification using facial patches

SATURDAY, 23 JULY 2016

Session	:	Invited Talk
Title	:	Telecommunication Technology evolution towards network functions virtualization
Speaker	:	Mr. Raja Duraisamy, Solutions Architect, Telecommunications, Singapore,
Time	:	9.30pm – 10.30pm
Hall	:	Senatus Hall

Session	:	T1-S6
Theme	:	Communication Engineering
Time	:	10.30pm – 12.05pm
Hall	:	Senatus Hall

S6-A1	10 - Design and Hardware Implementation of FPGA Based SDR for FM/FSK Demodulation and BPSK Modulation for Satellite Communication Systems
S6-A2	106 - Modeling of Broadband Power Line Communication in last-mile networks
S6-A3	59 - Efficient Implementation of Parallel Concatenated Gallager Codes with Single Encoder
S6-A4	165 - Multi-channel Hexagonal Surface Coils for 1.5T MRI Scanner

Session	:	T2-S6
Theme	:	ImageProcessing -IV
Time	:	10.30pm – 12.05pm
Hall	:	Aryabhata Hall

S6-B1	24 - Performance Evaluation of Feature Extraction Techniques on Natural Image Prior in Visual Image Reconstruction
S6-B2	60 - A Semi-Automated Technique for Vertebrae Detection and Segmentation from CT Images of Spine
S6-B3	127 - A Novel Shadow Removal Algorithm Using Niblack Segmentation in Satellite Images
S6-B4	120 - Shearlet Transform Based Image Denoising Using Histogram Thresholding

Session	:	T3-S6
Theme	:	Computer Networks
Time	:	10.30pm – 12.05pm
Hall	:	Faraday Hall

S6-C1	30 - Decision Tree Based Rules for Entity Identification
S6-C2	107 - Rule based method for Entity Resolution using Distinct Tree Construction

Session	:	T1-S7
Theme	:	Communication Networks -II
Time	:	1.00pm –2.20pm
Hall	:	Senatus Hall

S7-A1	82 - SoC Implementation of a Modulation Classification module for Cognitive Radios
S7-A2	32 - Noise Variance Estimation Through Penalized Least-Squares for ED-Spectrum Sensing
S7-A3	140 - Energy Detection of Unknown Signals with Diversity Reception in λ - μ Fading Channel

S7-A4	147 - Utility Maximization of Three Phase Spectrum Leasing Scheme Using Stackelberg Game
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Session	:	T1-S7
Theme	:	Multicarrier Communication
Time	:	1.30pm –2.50pm
Hall	:	Aryabhata Hall

S7-B1	68 - Extended Gaussian Function based Adaptive Filter Design for Filter Bank Multicarrier Systems
S7-B2	75 - Transmit Precoding with Encoding using Zadoff-Chu Sequence for MIMO-OFDM System
S7-B3	101 - Analysis of Carrier Frequency Offset in WFRFT-OFDM Systems using MLE
S7-B4	73 - Performance Analysis of Fast Convolution Based FBMC-OQAM System

INVITED TALKS

1. **Dr.S. Raghavan,**
Professor,
Dept. of ECE,
NIT – Trichy
Topic:Planar Antennas

Abstract:Planar Antenna which has the advantages of low profile, compatibility with integrated circuit technology and conformability is the solution for the requirements of many applications. Planar antennas find usage in military applications such as aircraft, missiles, rockets, commercial areas such as mobile satellite communications, the Direct Broadcast Satellite (DBS) system, global position system (GPS), Health care, remote sensing etc. The back bone of planar antennas is planar transmission line. Planar transmission lines include Stripline, Microstrip, Slot line, coplanar waveguide, coplanar strips, Fin line and Substrate Integrated Waveguide. The lecture topic includes the 'essentials of planar transmission lines', 'design fundamentals of planar antennas' and the 'transmission line analysis approach'.

Biographical Sketch:Dr.S.Raghavan is a senior Professor in Electronics and Communication Engineering Department, National Institute of Technology (N.I.T.), Trichy and has 33 years of teaching and Research experience. His interest includes Microwave Integrated Circuits, RF MEMS, BioMEMS, Metamaterial and Microwave Engineering. Proud research scholar of Prof.BharathiBhat and Prof.SK Koul, CARE, IIT Delhi, has established state of the art Microwave Integrated Circuit and Microwave Laboratory in N.I.T., Trichy with the help of Govt.Of India funding. Won Best Teacher award twice and conferred with Honorary Fellowship of Ancient Sciences and Archaeological Society of India, Short time visiting Fellow in California State University, North Ridge, USA. Awarded to conduct Tutorial in APEMC 2010, Beijing, China. Organizing Chair of 'Indian Antenna Week 2014', Chandigarh. Invited to be a session chair in PIERS 2013 symposium Taipei, Taiwan. Hs to his credit 80 research papers in International Journals, 70 in IEEEExplore, 130

International conferences, 26 National conferences. Guided more than 8 Ph.D.scholars. Senior Member/Fellow in more than 20 international and national Professional Societies including IEEE, IEI, IETE, CSI, TSI.Organized various workshops of national importance. Has contributed lot in the development of state of the art Library and Hospital in NIT T. Was President of R.E.C.,Trichy. Faculty association for 2 years. Made an impact in MICROWAVE ENGINEERING EDUCATION among student community at large.

2. Dr. Sriram N. Kizhakkemadam,

Senior Chief Engineer,
Samsung R&D Institute,
Bangalore

Topic: LTE in Unlicensed Band: Opportunities & Challenges

Abstract:Cellular transmission was primarily aimed at providing reliable communication with mobility in the licensed spectrum. With increasing data usage, the 3GPP has now standardized the access of unlicensed spectrum by using enhancements to existing LTE technology. LTE in the unlicensed band currently has various flavors: LAA (License Assisted Access), LTE-U (LTE-Unlicensed), LWA (LTE Wi-Fi Aggregation) & LWIP (LTE WLAN Aggregation with IPSec Tunnel). In this talk, we delve in to the relative merits and challenges of each of these new access mechanisms and its relevance with regard to the upcoming millimeter wave based 5G transmission techniques.

Biographical Sketch:Dr. Sriram N. Kizhakkemadam leads the research on cellular communications in Advanced Technology Labs (ATL) at Samsung R&D Institute Bangalore. His team works on providing enhanced solutions for LTE Networks and devices including high performance Application Layer Error Correcting Codes for Multicast (eMBMS), Transport solutions for millimeter-wave networks, Distributed Scheduling for License Assisted Access Small Cells etc. His team at ATL has also developed a 3GPP calibrated System Level Simulator for LTE. Dr. Kizhakkemadam earned a Ph.D from Southern Methodist University and an M.S. from Pennsylvania State University.

3. Dr. Krishnaraj M. Varma,

Senior Hardware Engineer, Hughes Network Systems, Germantown,
Maryland, USA

Topic: "The Evolution of WiFi: From Fighting Microwaves To The Internet Of Things"

Abstract:With the advent of ubiquitous, always connected, personal devices, WiFi has become the network of choice for a large cross-section of users. WiFi provides high throughputs to a large number of connected devices at little or zero recurring costs on top of the cost of WAN. The talk will cover the evolution of WiFi from its early days in the 2GHz unlicensed spectrum to its present form. Particular attention will be paid on the latest draft standard (802.11-AX) and at the general principles that are used to design physical-layer air-interface standards.

Biographical Sketch:Dr.Krishnaraj M. Varma completed his undergraduate degree in Applied Electronics & Instrumentation Engineering from College of Engineering, Trivandrum, University of Kerala(1997), followed by a Masters degree in the field of audio array processing from Virginia Tech(2002) and a PhD in the field of image processing and compression from Virginia Tech (2006). Since completing his PhD he has worked for over 10 years in the industry designing baseband modem chips for satellite communications (Hughes Network Systems LLC.) and WiFi(Qualcomm Inc.). His interests and expertise are in the areas of signal-processing, receiver design, hardware architectures for signal-processing algorithms, statistical modeling of receivers, satellite communications, WiFi, science and engineering education etc. His nonprofessional interests are in travel and food.

4. Raja Duraisamy

Solutions Architect,
Telecommunications, Singapore

Topic: "Telecommunication Technology evolution towards network functions virtualization"

Abstract:Mobile Technology has evolved from 2G to 3G to 4G to provide download speeds of 150 Mbps in LTE and still evolving to provide speed

up to 1Gbps and much more in 5G. Network Architecture has evolved from hierarchical to flat IP architecture. Cloud Computing model has inspired similar architectures of NFV and SDN in telecom network. NFV decouples software implementations of Network Functions from the compute, storage, and networking resources through a virtualisation layer. This talk will focus on technology evolution and how network virtualisation simplifies the implementation and operation of network, to provide almost unlimited scalability and agility that in turn, enables network operators to become digital service providers.

Biographical Sketch: Raja is a Telecommunications Professional with extensive industry experience and expertise in all phases of project lifecycle from Software Development, Solution Architecture, System Engineering, Proof-of-Concept Technology Trials; to Project Planning, Management & Execution for Mobile Communication systems. Raja is currently working as a Solutions Architect and leading the SmallCell/WiFi deployment in AsiaPacific/Japan and involved in Cloud/Network Virtualization Solution Architecture projects. Raja was with Nokia Siemens Networks, where he conducted an LTE trial which won a commercial contract with Bharti AirTel in India. He was also the Technical lead for several new Technology Trials and deployments for operators like Vodafone, TTSL and Videocon. Prior to NSN, he was with Motorola in Singapore for 17 years, where he started as Engineering Lead for Maxis's first GSM and MobileOne / Telekom Malaysia's CDMA Network Deployments. He was then the regional Core Engineering Manager, leading a skilled and motivated Regional core Engineering Team for Pre Sales Solutions Support / Post Sales Technical support for all new and emerging technologies (NGN /3G/ IMS / WiMAX / LTE etc), especially IP / Applications related portfolio. He envisioned and established a Seamless Mobility Center of Excellence to showcase next generation technologies, including live demonstrations at several industry conferences. During the first years of his career, he developed GSM mobile phone Software for PCI/Institute of Micro Electronics, one of the leading Research Institutes in Singapore and also developed X.25 /X.75 based wide area data network system in addition to its real-time operating system, at Switching R&D of ITI Ltd, Bangalore, India. Raja received his Bachelor's degree in Mechanical Engineering from PSG Tech and Master's degree in Computer Science from Indian Institute of Science, Bangalore, and has published research papers in International journals.

T1-S2Communication Networks -I

84 *Worm Hole-Black Hole attack Detection and Avoidance in Manet with Random PTT using FPGA*

Arun Kumar K A

Manet or Mobile Ad-Hoc Networks are self-forming networks which does not require a fixed infrastructure for its communication. Manet plays a critical role in Military Communication and Disaster Management system. Initially there will be multiple nodes with separate address assigned from an address pool, which will form the network when needed. Worm-hole attack and black-hole attack are the severe security issues faced by Manet. The normal security mechanisms like encryption and authentications have no big roles in these types of attacks. The paper discuss the FPGA implementation of black hole-worm hole detection and avoidance algorithm. The packets from a black-hole or worm-hole are detected in the MAC-Physical layer itself by randomly varying the Packet Travel Time (PTT). The Mac layer and the physical layer are implemented using Partial-Reconfiguration technique so that the symbol rate, modulation schemes and coding rate can be changed randomly while the system is running without using extra hardware. Probe request and probe response messages are used to ensure authentication for the nodes for forming the network.

88 *Frequency Offset Estimation of WiMAX using Repeated Preamble*Mithra Elsa Thomas, Suma Sekhar

Wide area network for cellular communications, are implemented by towers .The main advantage of WiMAX is that it supports movement from one place to another. However this WiMAX faces the mismatch in frequency during transmission which in turn leads to inter carrier interference and loss of orthogonality in the carriers used for transmission. Thus CFO estimation and compensation needs to be carried out for these systems to increase the efficiency of data transmission. The CFO estimation technique used here is a data aided technique that makes use of a preamble to attain the estimate. The preamble has been designed using optimized GCL sequences which increases the accuracy of

CFO estimation. The method used for phase compensation in this method is phase rotation.

100 Comparative Analysis of Offset Estimation Capabilities in Mathematical Sequences for WLAN(100)

Suma Sekhar

In this paper, the performance of different mathematical sequences used for data aided offset estimation in Multiple Input Multiple Output Orthogonal Frequency Division Multiplexing (MIMO OFDM) is analyzed. If the synchronization system uses multiple preambles, side lobes of preamble can degrade timing synchronization performance and care to be taken to minimize them. The synchronization performance of binary sequences PN and Barker are compared with complex exponential CAZAC and Zadoff Chu sequences. The parameters used for evaluation includes timing metric based on Schmidl and Cox algorithm, Minn algorithm and integrated side lobe levels of preambles. As the accurate estimation and correction of timing and frequency offset is a crucial factor in Wireless Local Area Networks (WLAN) using MIMO OFDM, the selection of apt sequences in preamble structure have great importance for maintaining synchronization.

T1-S3 Microwave Communication-I

116 Compact Multiband Microstrip Patch Antenna For Wireless Applications

Amal K A, Subin Joseph, Sreekumariamma,
Ajoykumar Mondal & R. Ratheesh

A Microstrip patch antenna that can be used for Wi-Fi, Bluetooth and WIMAX frequencies, has been proposed in this work. The objective of the work is to design an antenna with multiple resonances at 2.45 GHz, 3.6 GHz and 5.3 GHz and miniaturization of the patch using high dielectric constant. Microwave substrate of size 30mm x 30mm having a dielectric constant of 10.2 and a loss tangent of 0.002 is used to fabricate the antenna. The desired frequencies are obtained by cutting slots in the patch and impedance matching is done by providing defective ground.

The miniaturized antenna is fabricated through photo etching process, tested and the results are validated with simulation result.

91 *Design and Development of a Dual Directional Coupler with Transformers for HF band applications*(91)

R. Vishnu

Dual Directional Couplers have profound application in RF and microwave instrumentation. This paper presents the design and development aspects of a dual directional coupler operating in the HF band using transformers. The coupler was assembled and tested on a PCB and detailed measurements were taken using Network Analyser. It was successfully integrated into the Power Amplifier Unit of a Software Defined Radio Transmitter for VSWR and power monitoring. The performance analysis was done upto 150W of RF power.

78 *Compressive beamforming using greedy algorithms*

Maya K. Baburaj ,Sooraj K. Ambat&Sheeba V.S.

Direction of Arrival (DOA) estimation is a topic of great interest in many fields like electromagnetic, seismic/ geophysical and acoustic sensing. High resolution algorithms for DOA estimation have been widely used in applications like SONAR, RADAR and wireless communications to resolve closely-situated sources. However these algorithms are very sensitive to the signal to noise ratio (SNR), the number of snapshots and correlation between sources. The DOA estimation problem can be viewed as a sparse representation problem as the signals impinging on an array are intrinsically sparse in the spatial domain. Hence compressed sensing techniques can be applied in DOA estimation. This paper explores the formulation of the DOA estimation as a sparse representation problem and compares the performance of different compressive beamforming techniques. Compressive beamforming is done using l_1 minimization and greedy algorithms. It is shown that greedy algorithms are faster than l_1 minimization. An improvement to greedy algorithm is proposed in this paper so that prior information about sparsity is not needed. Resolution is further improved using multiband signals. Thus the study shows that

compressive beamforming can give 2 to 3 degree resolution from single snapshot which is better than existing methods.

T1-S5 Microwave Communication-II

69 *Determination of Propagation Constant Using 1D-FDTD with MATLAB*

Domma Veerlavenkaiah and S. Raghavan

This report mainly concentrates on determination of propagation constant of a planar transmission lines such as Microstrip line and coplanar wave guide (CPW) by 1D- FDTD using conventional MATLAB code. Apart from that, this article presents study of basic phenomenon like reflection at an interface between two media, and design of material absorbers. The fields E_y and H_z are simulated along the line $Y=Z=0$ i.e. propagation along X-axis. Implementation of source (Gaussian pulse, sinusoidal) and effects of various boundaries such as Mur ABC, PML on incident/scattered/total fields are investigated. Also presented a comparison plot of phase constant by using CST microwave studio and MATLAB.

166 *Design Of L Band Cavity Filter For GPS Receiver*

Judith Sen E, Shanil Mohamed N, Smitha KS, Sherly Joy, T.J Apren, K.K Mukundan

Filters play a critical role in RF and Microwave systems and the type used depends on the application. It is used in the receiver front end to improve selectivity and in transmitter for spurious /harmonic rejection where low insertion loss and narrow bandwidth are the major requirements. This paper, deals with the design of a narrow band cavity filter in L band with centre frequency of 1575.42 MHz. It is planned to use at the front end of a GPS receiver where the system has to withstand the harsh environment of launch vehicle. The cavity filter is designed for the required specification, simulated and optimized using the software Advanced Design System (ADS) and ElectroMagnetic Professional (EMPro).

74 Analysis Of Mode Of Propagation In Substrate Integrated Waveguide Using FDTD(74)

Ananya Parameswaran, Dr.S.Raghavan

Substrate Integrated Waveguide is a hybrid of planar and non-planar structures. It is synthesized using the advantages of non-planar Rectangular waveguide for high power handling capacity, low losses and planar microstrip line for ease of fabrication, low profile and low weight. In this paper, an analysis of Substrate Integrated Waveguide is done by simulating a design in CST Microwave Studio, and mode of propagation present in the wave guiding structure is coded using MATLAB in one of the Numerical Computational Electromagnetics method namely (Finite Difference Time Domain) FDTD.

T1-S6 Communication Engineering

10 Design and Hardware Implementation of Reconfigurable Nano Satellite Communication System Using FPGA Based SDR for FM/FSK Demodulation and BPSK Modulation(10)

Nivin R, Dr. J Sheeba Rani, Vidhya P

Communication system is one of the major areas in which digital signal processing finds direct application. Recent advances in signal processing have helped in enormously reducing the complexity of communication system design and also in improving the performance of the system. Software Defined Radio (SDR) enables in-orbit re-configurability of frequency, modulation scheme, data rate, bandwidth and channel coding in the case of satellite communication systems where component change is not possible after launch. This paper describes the design and hardware implementation of SDR type communication system based on FPGA for a nano satellite. The major functions carried out onboard are FM/FSK demodulation for telecommand uplink and BPSK modulation with raised cosine filtering for telemetry downlink. The full system is designed and implemented based on Microsemi Smartfusion2 FPGA. For hardware evaluation of the system, Virtex-6 FPGA with high speed analog daughter

card is employed. Test results are also provided at the end of the paper along with implementation of re-configurability.

106 Modeling of Broadband Power Line Communication in last-mile networks

Jonitha Joseph P

For last-mile networks the in-building electric power lines are considered an attractive medium for high-speed data transmission. In this paper we consider the channel response in the 1-30MHz band. The development of a Broadband Power-Line Communications (BPLC) network topology is analyzed so as to obtain better performance through channel modeling. The performance of the system by varying the transceiver positions and distance between derivation box to outlets with load and without load scenarios are studied. A model of a floor plan of an apartment building is selected and the characteristics of the channel responses for various topologies are examined with the help of FTW simulator. Thus, the importance in modeling the network topology is investigated.

59 Efficient Implementation of Parallel Concatenated GallagerCodes with Single Encoder

Aswathy G P, Niyas K Haneefa

Parallel Concatenated Gallager Codes (PCGCs) have proved to be an effective way to improve the bit error rate (BER) performance by increasing the redundancy at the same time reducing the encoding and decoding complexity when compared to dedicated Low Density Parity Check (LDPC) code of same length and code rate. Existing PCGC with single encoder has not been extensively successful due to its performance limitation, decoder complexity and decoding delay. In this paper we propose an efficient decoding methodology for PCGC with single encoder. We show that the proposed methodology outperforms existing PCGC with single encoder in terms of BER performance in AWGN channel. We also present that the proposed decoder is much less complex than existing one.

165 Multi-channel Hexagonal Surface Coils for 1.5T MRI Scanner

Mahesh Kumar Chaubey, Prof. Mridula Gupta, Rajesh Harsh, Tapas Bhuiya

Radio-Frequency coil is the major component used in the detection of Nuclear Magnetic Resonance Signal. Usually the Radio Frequency coil is designed for operation on a specific Magnetic Field strength based Magnetic Resonance Imaging system. Multi-element phased coils, offers the high signal-to-noise ratio (SNR) and Resolution of a small surface coil over field of view (FOV) normally associated with body imaging with no increase in imaging time. Multi-channel phased array coil Imaging is an advanced method for obtaining high Resolution Images with enhanced signal-to-noise ratio (SNR) and large field of view (FOV) compared to single loop surface coil. This paper describe the method of Implementing a Hexagonal Surface type Receive only Radio Frequency coil which has ability to detect the Nuclear Magnetic Resonance Signal of ^1H Nuclei at 63.87 MHz Resonance Frequency for 1.5T Magnetic Resonance Imaging scanner. The RF coil in MRI is used for excitation of the Magnetization and to receive the Signal from the excited spins. A surface coil is usually a loop of conducting material designed specifically for localized body regions. These coils have high SNR and uniform sensitivity. The Return loss of fabricated surface coil is 24.521 dB and bandwidth is 0.188 MHz.

T1-S7 Communication Networks -I

82 SoC Implementation of a Modulation Classification module for Cognitive Radios

Arun Kumar K A

The Cognitive radios are intelligent Software Defined radios which is aware of its environment by scanning and identifying spectrum holes. The knowledge of the modulation scheme of the received signal is significant to judge the channel and configure the SDR to transmit and receive. The two broad fields of modulation recognition are pattern recognition and

decision theoretic approaches. This paper discusses Zynq implementation of an adaptive modulation recognition system which includes decision theoretic approach and higher order cumulants. Zynq is a SoC with Artix-7 FPGA and dual Core ARM Processor. The highly complex computations like FFT, higher order cumulants computations are implemented in FPGA and neural network algorithms are implemented in the ARM processor. The SNR based higher order cumulants computation will differentiate 16-qam, 32-qam, 64-qam, bpsk, qpsk and 8psk signals. The standard deviation computation of the zero centered instantaneous phase, amplitude and frequency are used to identify the MASK and MFSK signals. The FM signals are identified by the computation of the spectral power density.

32 Noise Variance Estimation Through PenalizedLeast-Squares for ED-Spectrum Sensing

B.Naveenkumar, S.ChrisPrema

Cognitive Radio (CR) is an auspicious solution to current problem of spectrum scarcity due to evaluation of new technologies. These techniques are useful in detecting spectral holes, and allocating them to secondary users. Energy Detection is a predominant method for spectrum sensing due to its low computational complexity and capability of detecting spectrum holes without requiring apriori knowledge of primary signal. The energy based spectrum detectors depends on the precision of threshold chosen to distinguish signal and noise. But, energy detection needs to estimate the noise variance for finding the detection threshold. Most of the conventional techniques use fixed threshold with known noise variance. In practical scenarios noise variance is unknown, so we are proposing a fast computational noise variance estimation algorithm for spectrum sensing using Penalized Least Squares (PLS). We have introduced a smoothing parameter which is determined by Discrete Cosine Transform (DCT) as the penalizing factor. The amount of smoothing is determined by minimizing Generalized Cross Validation (GCV). Simulations were carried out in AWGN and Rayleigh fading channels for the proposed noise variance estimation through which Receiver Operating Characteristics (ROC) are obtained.

140 Energy Detection of Unknown Signals with Diversity Reception in $\lambda - \mu$ Fading Channel

Sanjay Singh Yadav, Sourabh Singh Rajput, S Hariharan, PMuthuchidambaranathan

In this paper, we obtained the closed form analytical expression for the average detection probability of the energy detector in terms of series form expression over $\lambda - \mu$ fading distribution. We start with the no-diversity case, then further results are extended to two diversity reception cases such as square-law-selection (SLS) and collaborative detection case. Since arriving analytical expression is used for the obtaining the different fading distributions of $\lambda - \mu$ fading channel. The performance analysis of energy detection is also discussed with the receiver operating characteristics (ROC) curves. Our closed form expression is validated by numerical results.

147 Utility Maximization of Three Phase Spectrum Leasing Scheme Using Stackelberg Game (147)

Gayathri R. Nair, Yamuna K. Moorthy

Cognitive Radio (CR) is a promising technology to alleviate spectrum scarcity problem. CR enables a technique called spectrum leasing where the secondary users are able to access licensed spectrum bands opportunistically by making monetary payment. A three phase spectrum leasing scheme is considered where primary user allows users in a distributed secondary network to access its licensed band either in underlay or overlay CR transmission manner. A network of multiple users competing for the same idle spectrum ends up causing intolerable interferences to the primary receiver. An improved interference alignment technique is incorporated to reduce the effect of interference at primary receiver while maximizing the SINR at each receiver. Since the idle spectrum of PU is a valuable commodity and many users are competing for the same time, there arises conflict among them in taking decisions. This issue is resolved using game theory. The problem is formulated under Stackelberg game framework and optimal strategies are found out at the equilibrium. Using these optimal strategies, it is found out that the utility of users is improved. Simulations are carried out

to study the proposed system and an improvement in performance is observed under various network conditions.

T1-S7 Multicarrier Communication

68 *Extended Gaussian Function based Adaptive Filter Design for Filter Bank Multicarrier Systems(68)*

Divya Prakash, Sakuntala S. Pillai

Filter bank multicarrier (FBMC) systems have been adopted as the most promising physical layer candidate for next generation wireless communication standards. The prototype filter in the FBMC system plays a key role in determining the system performance. An enhancement in transmission performance is possible, if a flexible pulse shape adaptive scheme is utilized in FBMC systems rather than going for a compromised choice of a fixed prototype filter. A relationship between the parameter of the filter with which the filter is adapted and the ratio of filter spread in time and frequency is also established. The dominance in performance of the proposed filter over the state-of-the-art filters is demonstrated through bit error rate (BER) and signal to interference (SIR) plots under doubly dispersive channel conditions.

75 *Transmit Precoding with Encoding using Zadoff-Chu Sequence for MIMO-OFDM System*

Neetha Mariam Jacob, Luxy Mathews

Transmit precoding utilizes the channel state information (CSI) to precode the data so that the effect of fading is equalized. Three simple precoding schemes for Rayleigh fading multiple-input multiple-output (MIMO) system are explained. CSI is required only at the transmitter and not at the receiver. So the computational complexity is reduced at the receiver. The bit error rate (BER) at the receiver can be reduced by encoding the data using Zadoff-Chu sequence. Simulation results illustrate the obtained BER performance. A comparison with encoding using Gold sequence is also provided.

101 Analysis of Carrier Frequency Offset in WFRFT-OFDM Systems using MLE

HariPriya.V.S, Suma Sekhar

Traditional Orthogonal Frequency Division Multiplexing (OFDM) system is a multi carrier transmission technique that splits data stream into a number of data subcarriers in parallel. In this method, a 4-Weighted Fractional Fourier Transform (4-WFRFT) is proposed for modulation / demodulation of the subcarriers. The method uses Maximum Likelihood Estimation (MLE) for Carrier Frequency Offset estimation and correction in MIMO-OFDM systems. The proposed method makes efficient use of the frequency spectrum by unifying the two competitive carrier schemes – single carrier (SC) and multi-carrier (MC). The distortion resistance capability of the communication system is improved. The mean square error performance (MSE) of WFRFT-MIMO-OFDM systems is analyzed here.

73 Performance Analysis of Fast Convolution Based FBMC-OQAM System

Geena Liz David, Dr. Sheeba V.S, Job Chunkath, Meera K.R

Filter Bank based Multicarrier (FBMC) system is a multicarrier scheme that has recently gained attention due to its better spectral properties compared to OFDM systems. FBMC system is one among the strong contenders for 5G implementations. While better designs of FBMC systems are evolving with time, it is imperative that the hardware complexity is not overlooked. It is important that filter bank designs with reduced computational resources are sought. Reducing computational complexity offers advantages like less power consumption, faster computations and reduced runtime resources. These advantages have more significance in 5G where ultra high speed and ultra low latency are the highlights. Filter bank designs using fast convolution employ less arithmetic resources compared to polyphase filter bank implementations. The fast convolution filter design makes use of only filter's frequency domain sample values for filtering since the filtering is restricted to frequency domain. So the conventional polyphase implementation of filter is completely done away

with. In this paper, we present FBMC/OQAM system using Fast Convolution and the performance of the system is evaluated in a communication channel. The system is compared with conventional polyphase FBMC/OQAM system and it is found that fast convolution based system outperforms polyphase implementation of FBMC system in computational complexity and BER performance.

T2-S2Image Processing -I

27Multimodal Face Recognition using Spectral Transformation by LBP and Polynomial Coefficients

Naveen S, Ahalya R K and Dr R.S Moni

This paper presents a multimodal face recognition using spectral transformation by Local Binary Pattern (LBP) and Polynomial Coefficients. Here 2D image and 3D image are combined to get multimodal face recognition. In this method a novel feature extraction is done using LBP and Polynomial Coefficients. Then these features are spectrally transformed using Discrete Fourier Transform (DFT). These spectrally transformed features extracted from texture image using the two methods are combined at the score level. Similarly this is done in depth image. Finally feature information from texture and depth are combined at the score level which gives better results than the individual results.

96 Single Shot High Dynamic Range Imaging usingPower Law Transformation and Exposure Fusion

AthiraRaveendranath,Anoop K. Johnson

High Dynamic Range Imaging (HDRI) is an emerging technique for the generation of high quality images. Most commonly adopted method for generating HDR images is the fusion of multiple exposure Low Dynamic Range (LDR) images. But in such cases the output image can get affected by certain artifacts such as image misalignments, ghosting etc. Single shot HDR Imaging is an efficient approach to overcome these artifacts. In this paper, we propose a method for the generation of high dynamic range image from a single input image using power law transformation. Power law transformation generates differently exposed images by varying the gamma value of the input image. Once the multiple exposure images are generated, they are fused together based on certain quality measures such as contrast, saturation, well exposedness etc. The result shows the effectiveness of the proposed approach which is verified qualitatively and quantitatively.

123 Multi-focus Color Image Fusion using NSCT and PCNN(123)

Gayathri N. , Deepa P. L.

Image fusion combines different images of same scene from different sensors or from the same sensor at different times to create a new image. Due to limited depth of focus of optical lens, it is often impossible to acquire an image that contain all relevant focused objects, some objects will be in focus some others will be out of focus. Using multi focus image fusion one can get one image with all of objects in focus. Image fusion methods are usually divided into spatial domain and transform domain techniques. One of the simplest spatial domain methods is block method but it causes block effect. Another important spatial based method is focused region based method which is able to detect the clear regions of source images and then directly copy the pixels from clear region to fused image. However, these methods generate artificial information and discontinuous phenomenon at border of focused region. This will affect visual fidelity of fused image. Compared with spatial based methods, methods using multi scale transform successfully overcome the above mentioned disadvantages. Image fusion methods based on Non-Subsampled Contourlet Transform (NSCT) and perform very well for gray scale images. In this paper, a new method multi-focus image fusion is proposed that is suitable for color images using NSCT and Pulse Coupled Neural Network (PCNN).

T2-S3Image Processing -II

89 3D Face Reconstruction by Pose Correction, Patch Cloning and Texture Wrapping

Naveen S ,Rugmini K P &Dr R.S Moni

Face is being considered as one of the most commonly used biometric modality. The inaccuracy in two dimensional face recognition systems is mainly due to pose variations, occlusions, illumination etc. Among this, changes in illumination condition do not affect 3D face recognition systems. But pose variation drastically changes the appearance of face images. To solve the problems with depth map and texture images corrupted by head

pose variations and the occlusions generated due to these pose variations, a reconstruction method is proposed which consist of three stages. In the first stage, the pose correction is done by Iterative Closest Point (ICP) algorithm and in the second stage the occluded region of the face is reconstructed by a resurfacing method called patch cloning. It is followed by the wrapping of reconstructed depth map by its texture to generate a 3D model. The statistical error between the original face and the reconstructed face is also evaluated. In this work, facial symmetry is used as a prior knowledge. Experiments are done with the FRAV3D database.

109 Spatial Resolution Enhancement OfHyperspectral Image By Negative Abundance Oriented Spectral Unmixing

Gayathri S A &Renjith R J

Hyperspectral images possess high spectral resolution, and are capable to give spectral information of different elements in the scene. The spatial resolution of hyperspectral image is very low. This leads to mixing of pixels. Spectral Unmixing algorithms are the most extensively used hyperspectral image analysis techniques for decomposing the mixed pixels. However spectral unmixing does not enhance the spatial resolution. In order to enhance the spatial resolution of hyperspectral image we propose a Hyperspectral-Multispectral image fusion method. The image fusion is based on a negative abundance oriented hyperspectralunmixing algorithm. The algorithm is tested with images from Airborne Visible/Infrared Imaging Spectrometer (AVIRIS) data.

119 Wavelet-Based Marker Controlled Watershed Transformation

Arya S P &Aparna P R

A new method for the generation of super pixels which can be implemented using watershed transformation and also threshold based estimation for image denoising in the wavelet transform domain. Recovery of the image from its noisy atmosphere is also an area of interest in this paper. Our method aims at the extraction process of local and global

impression of a given image by giving priority to image denoising also. We propose a gradient-based segmenting adherity property of the segmented image. We also show this as an efficient method to achieve the regularity and adherence property of the segmented image. Since we are dealing with marker controlled Watershed transformation technique, the problem of over-segmentation can be avoided to a great extreme.. Partial- thresholding to smoothness and preservation of better image details can be also seen in this work. Better PSNR, MSNR and correlation parameter can be achieved through wavelet thresholding. Here, we try to showcase ‘markerpixels’ as an efficient tool for the creation of superpixels using Watershed transformation and also wavelet transformation process for denoisedwaterpixel segments. Thus a combination of wavelet based- controlled watershed segmentation can be seen through this work. Soft-thresholding and hard-thresholding are used for image denoising. By this work, it is shown that this method offer better PSNR and MSE.

T2-S2SpeechProcessing

48 Estimation of Vocal Tract Shape of Vowels for Children

Veena S, Nilashree S Wankhede and Dr. Milind S Shah

This paper presents the methods used for vocal tract shape estimation i) Covariance method ii) Lattice Method. The study aims to estimate vocal tract shape of vowels /a, e, i, o, u/ uttered by children and covers the children in the age group of 4 to 18 years. In addition images of children articulating vowels were taken to obtain the lip area of child. A comparison of vocal tract shape obtained with lip area assumed to be 1cm² is done with the shape obtained by actual lip area. In case of vowel /u/ the normalized area values obtained were found to be reduced for most of subjects when accurate lip area was given. This could be due to value of lip area less than 1 cm².Vocal tract shape of 6 year old child is presented.

141 Performance Analysis of CELP Codec for Gaussian and Fixed Codebooks

Sooraj S, Ancy S Anselam

The design of high quality speech coders with low data rate is a very challenging task in speech processing. CELP provides good quality coded speech at a very low bit rate of 4.8kbps. Two types of codebooks namely Gaussian codebook and Fixed codebook are used in this analysis. The changes in the performance of the CELP codec is evaluated for these two codebooks. Optimization of the codebook can be done by improving the training process in the codebook generation stage. Two different types of codebooks, the Gaussian codebook and the fixed codebook is generated to be implemented in the G723.1 CELP codec and the variation in the performance is evaluated.

161 Audio Watermarking Technique using Modified Discrete Cosine Transform

Aparna S, Baiju P S

Audio watermarking is a data hiding technology widely used to increase the authentication of audio files and for copyright protection. Watermarking techniques hides copyright information, which can be a binary sequence or an image, within the audio signal in such a way that it is not perceivable by the listener. A large number of audio watermarking techniques are available. Authentication requires only a simple watermarking technique but to ensure security along with authentication, strong watermarking methods should be adopted. The proposed method uses watermarking based on Modified Discrete Fourier Transform (MDCT). Experimental analysis shows that the proposed method provides high audio quality when compared to other methods such as Discrete Cosine Transform (DCT) and Discrete Wavelet Transform (DWT).

T2-S4 Biomedical Signal Processing-I

121 Myocardial Infarction Detection Using Hybrid BSS Method

Devika M. G. , Dr. Gopakumar C., Aneesh R P, Gayathri R Nayar

This paper presents a novel technique for detecting myocardial infarction (MI) from ECG. Today, MI is one of the major causes of death worldwide. MI is a minor stage in lifelong cardiac disease, although rarely noticed, but can lead to sudden death. Since it is the first symptom of coronary artery disease, it is very important to detect MI in an early stage. For this purpose, several methods have been employed. But the hurdle is to detect MI efficiently from noisy signal, and also in an early stage. The problem lies in data acquisition system. Several noises get mixed with ECG signal, at the time of data acquisition and this make the extraction difficult. These noises can be due to respiration, EMG etc. The inefficient low pass filters of ECG machine add these noises to ECG signal. So to get a good input data, a perfect denoising technique is required, which is inevitable for the detection of small variations. The existing techniques use filters like notch and adaptive for denoising since they are not considering this raw ECG. It is proved that Independent Component Analysis (ICA) based on blind source separation (BSS) algorithms, is an effective tool for extracting ECG from a mixed raw signal. Better denoising gives better results for the early detection of MI. Thus the objective of this work is to detect myocardial infarction in an early stage. The classification is based on naïve bayes classifier. The presented algorithm gives 96.77% accuracy on PhysioNet ECG database, which is supported by the National Institute of General Medical Sciences (NIGMS) and the National Institute of Biomedical Imaging and Bioengineering (NIBIB).

130 *Advanced Earlier Melanoma Detection Algorithm Using ColourCorrelogram*

Soumya R S, Neethu S, Niju T S, Renjini A, Aneesh R P

Melanoma is a most dangerous form of skin cancer that develops from the pigment producing cells known as melanocytes. Melanoma skin cancers are also known as malignant melanoma. Recent studies show that the death rates of melanoma patients depend on the various stages of cancer, so early detection and treatment of melanoma implicate higher chances of cure. Now most of the existing skin lesion analysis system use ABCDE parameters for feature extraction. But these methods have lot of drawbacks. In this paper an advance earlier melanoma detection algorithm is proposed using colourcorrelogram and texture analysis. Bayesian classifier is used to detect the abnormal skin cells with colourcorrelogram and SFTA feature vectors. The system is successfully tested with the dermoscopic dataset and the experimental results show that the combination of colourcorrelogram and texture analysis give better results with an accuracy of 91.5%.

163 *An Accurate Method of Breast Cancer Detection from Ultra Sound images Using Probabilistic Fuzzy Clustering Algorithm*

Vidya V K , Santo Mathew

Breast cancer is the 2nd leading cancer diagnosed among world. The available methods like Mammogram, MRI ,CT, micro wave imaging and so on can detect both cysts and tumors in breast but possesses certain demerits. Ultra Sound is considered as an efficient way of breast cancer detection. This paper forward a method to classify benign and malignant tumor based on its boundary. Adaptive histogram equalization is used to enhance contrast. Hybrid filter is used to eliminate speckle noise. Probabilistic fuzzy clustering algorithm is employed to segment the ultra sound images. Morphological operations are done to extract specific regions. Comparison of hybrid filtered and homomorphic filtered images are done to find out the best speckle noise reduction filter.

134 A Robust Video Denoising System Using Optimised Surfacelet Transform

P. Sajith Sethu Mohammed Khalid

The conventional video denoising algorithms utilizes either a strenuous motion estimation step or by the frame by frame wavelet transformation without exploiting the correlation between neighboring frames. However, these schemes of video denoising results in videos with jittery edges and curves. The limitations of motion estimation based schemes are that they suffer due to aperture problems in optical flow and lighting variations. Surfacelet transform is a powerful tool for the representation of multidimensional data. Video signals can be treated as a different type of 3D signal and therefore can be processed using surfacelet transform which preserves the edge information and visual quality. By incorporating the advantages of surfacelet transformation with an advanced optimization technique we propose a novel video denoising technique which was found to be delivering overwhelming results in terms of peak signal to noise ratio (PSNR) and structural similarity (SSIM) index.

T2-S4 Biomedical Signal Processing-I

54 Blood Vessel Segmentation In Fundus Images And Detection Of Glaucoma

Lekshmi Shyam, Kumar G S

Blood vessel segmentation of fundus images has obtained considerable importance during the past few years since it facilitates the early detection of eye diseases. A method based on high pass filtering and morphological operation is introduced in the proposed method for vessel segmentation. The blood vessel segmentation in turn helps to provide a method for the detection of Glaucoma. In many of the earlier detection methods, analysis of cup to disc ratio is performed. But here the glaucoma is detected by means of ISNT ratio. The analysis is performed on Glaucomatous and normal eye. Ten images of each are collected from the database and ISNT ratio is calculated on each. The advantage of the method is that by

calculating the area of blood vessels in each of the four quadrant of the eye, glaucoma can be detected with less complexity in a simpler manner.

87 *ROI Lossless Colored Medical Image Watermarking Scheme with Secure Embedding of Patient Data(87)*

Deepa S,,Anitha Sandeep

Transmission of images via internet and it's authentication is of great importance with the booming techniques in the field of networking and information security. Medical imaging and it's secure transmission have grown up as a necessity. This paper focuses on reversible watermarking of medical images, both grey scale as well as color, preserving its ROI. It also effectively manages patient health record by securely embedding it inside the image before transmission which facilitates better archiving of data with comparatively lesser transmission bandwidth and much lesser chaos. This paper considers noisy and noiseless environments as different cases with different implementation for both. Also tamper detection and recovery of ROI makes this quite a useful technique in the upcoming color imaging era.

126 *Advanced Algorithm for Polyp Detection Using Depth Segmentation in Colon Endoscopy(126)*

AparnaRatheesh,PoojaSoman,Revathy Nair M, Devika R, Ganeesh R P

Colon cancer is a major cause of cancer in women and colorectal polyps are the important cause to colon cancer. Colonoscopy is one of the best method for detecting the colon cancer Colon endoscopy is a technique in which the image of the intestine can be obtained through the camera attached to endoscope and video sequence is further analysed.Algorithms for the automatic detection of polyps are being developed, with texture analysis.In this paper, a novel algorithm is proposed for the detection of polyps.In this paper two types of segmentation methods are adapted.In the first method,linearthresholding is used to detect the saturated region from the HSV image.In the second method, Markovian Random Field is

used to segment the image depth-wise. The proposed algorithm is based on extracting certain texture as well as color information from the frames captured by the camera. The proposed algorithm, is very simple, fast and efficient method which is highly helpful for the radiologists in detecting polyps. SVM classifier is used to predict the disease condition using the texture vector and color correlogram vector. The density of the polyp areas are also been estimated. This system is successfully tested with colon endoscopy video images and achieved accuracy of 96.7%.

153 Multistructure Brain Registration Using Multimodal Neuroimaging for the Detection of Alzheimer's Disease

Darsana S, Dr. Lizy Abraham

Alzheimer's Disease (AD) is an irreversible neuro degenerative brain disorder. The progression of AD can be traced from Magnetic Resonance Images (MRI) and Positron Emission Tomography (PET) images. The cortical features can be well extracted from MR images while PET images clearly resolve the subcortical structures of brain. The registration approach used in this paper is a multistructure registration approach. The multistructure registration approach eliminates the problem of partial voluming and information loss. The segmentation of white matter and gray matter tissue traces the amount of tissue loss associated with AD. The multistructure registration of PET and MR images allows loading information in to a central space. By adopting multimodal neuroimaging the correlation between the modalities is exploited for the study. The registration procedure is based on the fluid kinematic model of the brain volume. This preserves the underlying topology and anatomy while constraining the transformation to be smooth. In this paper a novel framework for the early detection of AD using multimodal neuroimaging is proposed. The differentiation of AD from Mild Cognitive Impairment (MCI) was also studied.

T2-S5 Image Processing -III

67 Robust Multiview Registration of Point Clouds

Dhanya S Pankaj, Rama Rao Nidamanuri

Multiview registration is an important part of the 3D modeling pipeline and it aims to bring all the partial views of a model in to a common co-ordinate system. In case of availability of redundant overlap area among the partial point clouds, motion averaging provides an efficient solution to the multiview registration problem. The averaging of underlying relative motions is performed in the corresponding Lie-algebra elements of the $SE(3)$ transformation matrices. However, in the presence of outliers in the set of relative motions this method is non-robust. We present a graph-based algorithm to filter out the relative motion outliers before performing motion averaging. The relative motions are assigned weights based on their agreement with global motions and other relative motions. The results indicate that our approach can introduce robustness to the motion averaging method of multiview registration by efficiently filtering out the outliers.

86 Face Recognition and Authentication using LBP and BSIF Mask detection and elimination

Naveen S ,ShihanaFathima R & Dr. R S Moni

In this paper, a face recognition and authentication method that can detect and eliminate the presence of the mask is proposed. The proposed method utilizes facial features, which are captured locally and globally to distinguish between a mask and a real face. The features employed here are extracted from the whole face as well as the eye and nose regions that are expected to provide a clue on the presence of the mask. Here, Local binary pattern (LBP) and Binarized Statistical Image Features (BSIF) are utilized to extract the texture features of the face for recognition. Then for classification Euclidean distance classifier is used whose scores are fused using the weighted sum rule for making the decision about a real face or a mask attack. 3D mask database 3DMAD is used for testing the algorithm.

136 Facial expression recognition and gender classification using facial patches

Anusha A V ,Jayasree J K , AnusreeBhaskar, Aneesh R P

Facial expression recognition and gender classification has many applications in affective computing as well as computer vision respectively. The main applications involve human computer interaction, driver safety etc. Principal component analysis(PCA), Linear discriminant analysis (LDA), Linear binary pattern(LBP) algorithms are used in most cases for the detection of facial expression and gender. The drawbacks of existing systems include lower classification rate in the case of low resolution images, confusion between different pairs of expression etc. In this paper, a novel method for facial expression recognition and gender classification based on the two expressions anger and joy along with geometric and appearance based method is proposed. Facial patches are used to detect both gender and facial expression. Facial expression is identified based on the appearance of facial patches. The proposed system successfully tested with Japanese female facial expression (JAFFE) database and Cohn-Kande databases.

T2-S6 Image Processing -IV

24 Performance Evaluation of Feature ExtractionTechniques on Natural Image Prior in Visual ImageReconstruction

MupparathyBabuLiby, JiniCheriyen

The functional Magnetic Resonance Imaging (fMRI) is one among the non-invasive techniques used in cognitive neuroscience, to record the activity of the brain. The fMRI reveals the functional activity caused by the Blood Oxygenated Level Dependent (BOLD) signals in the brain. The visual image reconstruction allows to translate neural brain activity pattern into the visual image (stimulus) that has caused the corresponding brain activity. The stimulus may be graphical characters, face images, handwritten characters and natural images. The proposed technique aims to develop a novel framework for visual image reconstruction of natural images from fMRI. The

exact reconstruction of natural images is challenging due to its complexity. The classification of image prior plays an important role in improving the accuracy of reconstruction. Since the image prior consists of multiple categories, like Gabor wavelet transform, Scale invariant feature transform (SIFT), Speeded Up Robust Features (SURF), Local Binary Pattern (LBP), Haar feature transform, Bag of Visual Words (BoVW) were tried on image prior. The extracted features are fed into the multiclass Support Vector Machine classifier followed by k-means clustering. An analysis on reconstruction done using different feature extraction techniques revealed that the Gabor feature extraction gave the highest accuracy in final results. The reconstruction of natural images was achieved with an accuracy of 80% till now. Also 70% accuracy was achieved in identifying the category and reconstructing the test stimulus from a real time test fMRI voxel responses. The proposed work focuses on developing an accurate, less complex and automatic software technique for visual image reconstruction of natural images.

60 A Semi-Automated Technique for Vertebrae Detection and Segmentation from CT Images of Spine

Jenny Patrick, Indu M.G.

Spine or backbone forms a supportive structure for all vertebrates, which is composed of complex bones known as vertebrae. Spine related pathologies are common and they are analyzed with help of various medical imaging techniques. Thus the detection and segmentation of vertebrae is gaining prime importance, as it can be used for the clinical analysis of spine. There are many semi-automated and automated approaches which are used to detect and segment individual vertebra from computed tomography (CT) images. But most of these approaches do not provide satisfactory results due to the anatomical similarities between the adjacent vertebrae and the effect of underlying artifacts. So to overcome these problems, a framework for individual vertebrae segmentation from CT images of spine is put forward. First of all, the vertebral body is identified with the help of iterative Normalized-cut algorithm which uses eigenvalue decomposition for the

detection procedure and the segmentation of individual vertebra is done using region based active contour method .

127 A Novel Shadow Removal Algorithm Using Niblack Segmentation in Satellite Images(127)

GeethuVijayan, Reshma S R, Dhanya F.E., Anju S., Gayathri R. Nair, Aneesh R.P.

Shadow is formed by the interaction of light with object. Effect of shadow is very crucial in the case of satellite image processing. Roads, buildings, trees etc are detected for various applications. But the interference of shadow makes mismatching of these objects. Several algorithms are being developed to detect and reconstruct the shadow region. This paper presents a Shadow detection technique based on Niblack segmentation. Niblack segmentation gives better shadow regions compared to Otsu's thresholding method and Sauvola based thresholding. Reconstruction of the shadow region is done by the Bayesian classifier. This classifier generate a training vector and reconstruct non shadow region from shadow region. Posterior probability is determined to reconstruct the nonshadow image intensity level. This algorithm is successfully tested with VHRS images.

120 Shearlet Transform Based Image Denoising Using Histogram Thresholding

Anju T S , Nelwin Raj N R

This paper presents an efficient image denoising method by incorporating shearlet-based histogram thresholding. Nowadays, digital images are used in wide range of applications but most of these images are degraded during transmission and acquisition process. Removal of noise from images is still a challenging task for many researchers because there is always a trade-off between noise removal and fine edge preservation. This paper is based on image denoising using shearlet transform. Shearlets have excellent features for data analysis and processing, which overcomes the limitation of traditional methods. They are optimally sparse and have multi-scale and multi-directional properties which are optimal in representing image containing edges. In this paper, the proposed method is found to produce

superior peak signal-to-noise ratio (PSNR) over the conventional denoising algorithms.

T3-S6 Computer Networks

30 Decision Tree Based Rules for Entity Identification

ShirinSalim and Linda Sara Mathew

Entity resolution (ER) or Entity identification is the process of identifying records referring to the same real world entity. Entity Identification is one of the most important problems in data cleaning and arises in many applications such as information integration and information retrieval. One of the challenges is entity resolution, when integrating data from different sources. As the volume of data on the web or in databases increases, data integration is becoming more expensive and challenging than ever before. For example, different persons may have identical name or other characteristics. So it is necessary to identify such complex records referring to same real world entity. Traditional entity identification approaches obtain a result using similarity comparison among records, assuming that records referring to the same entity are more similar to each other. However, such property may not hold so traditional ER approaches can't identify records correctly in some cases. The proposed framework develops a class of ER rules which are used for entity identification capable to identify the complex matching conditions between records and entities. By incorporating decision tree concept into the rule generation algorithm the proposed framework outperforms the traditional method. In the proposed method, by applying rules to each record, it is possible to identify which entity the record refers to.

107 Rule based method for entity resolution using distinct tree construction

AmmuArcha.P ,Lekshmy.D.Kumar

Entity resolution is the process of identifying the records that refer to the same entity. Rule based ER works by generating rules from the training dataset obtained from the given dataset and applying these rules to the records in the dataset. This method is very time consuming and tedious as the size of the rule set generated is very large. Also, the rules generated are

not efficient enough to classify the records correctly. So a distinct tree construct is proposed to generate the rules from the dataset. Distinct tree is constructed by arranging the dataset in a particular order before rule generation step. Experiments shows that the accuracy of rules generated using distinct tree method is more accurate and fast than simple Rule based ER.