

TUTORIAL SESSIONS

All tutorials will be held on **Monday, July 16** with three parallel sessions each in the morning and the afternoon, at the **Department of ECE**.

TITLE	TUTOR	TIME	PLACE
Teasing out the multi-scale representational space of cross-modal speech perception: Methods and mechanisms	Arpan Banerjee (NBRC)	09:30-13:00	ECE 1.07
5G: An Evolution Towards a Revolution	Karthik Sundaresan (NEC Labs)	09:30-13:00	ECE 1.08
PCA and Robust PCA for Modern Datasets	Namrata Vaswani (Iowa State)	09:30-13:00	ECE GJH
Need for Low Power Communications and Localization	Dinesh Bharadia (UCSD)	14:15-17:45	ECE 1.07
Video Streaming: On Rate-Adaptation, Multipath, Virtual Reality, and Content Distribution Network	Vaneet Aggarwal (Purdue)	14:15-17:45	ECE 1.08
Introduction to Reinforcement Learning	Harm Van Seijen (Microsoft Research)	14:15-17:45	ECE GJH

PROGRAM AT A GLANCE

Time	JN Tata Auditorium	Hall A	Hall B	Hall C
Tuesday, July 17				
08:00 - 09:00	Registration for SPCOM 2018 at JN Tata Auditorium			
09:00 - 09:15	Conference Inauguration [JN Tata Auditorium]			
09:15 - 10:30	TU01: <i>Coding for Data Communications and Storage</i>	TU02: <i>Audio and Speech Recognition and Classification</i>	TU03: <i>Optical Communications and Networks</i>	TU04: <i>Compressive Sensing and Applications</i>
10:30 - 11:00	Coffee Break			
11:00 - 12:00	Plenary Talk by Prof. Alexander Vardy [JN Tata Auditorium]			
12:00 - 12:15	Break			
12:15 - 13:15	TU05: <i>Cognitive Radio</i>	TU06: <i>Applications of Audio and Speech Processing</i>	TU07: <i>RF Systems for Communication - 1</i>	TU08: <i>Energy Harvesting Communication Systems</i>
13:15 - 14:15	Lunch			
14:15 - 15:30	TU09: <i>RF Systems for Communication - 2</i>	TU10: <i>Audio and Speech Processing - 1</i>	TU11: <i>Image and Video Signal Processing</i>	TU12: <i>Signal Processing Algorithms and Architecture</i>
15:30 - 16:00	Coffee Break			
16:00 - 17:45	SP.TU13: <i>Full Duplex and LPWAN</i>	SP.TU14: <i>Caching in cellular networks</i>	SP.TU15: <i>Computational Imaging</i>	SP.TU16: <i>Estimation and information theory</i>
Wednesday, July 18				
08:00 - 09:00	Registration for SPCOM 2018 at JN Tata Auditorium			
09:00 - 10:15	WE01: <i>Wireless, Vehicular and Smart Grid Networks</i>	WE02: <i>Speech Recognition</i>	WE03: <i>OFDM and Multicarrier Techniques</i>	WE04: <i>VLSI for Communication and Signal Processing</i>
10:15 - 10:45	Coffee Break			
10:45 - 11:45	Plenary Talk by Prof. David Gesbert [JN Tata Auditorium]			
11:45 - 12:00	Break			

Time	JN Tata Auditorium	Hall A	Hall B	Hall C
12:00 - 13:00	WE05: <i>NB-IoT</i>	WE06: <i>Spoken Language Processing</i>	WE07: <i>Forensics and Security</i>	WE08: <i>Physical Layer Security</i>
13:00 - 14:00	Lunch			
14:00 - 15:15	WE09: <i>Massive MIMO</i>	WE10: <i>Audio and Speech Processing - 2</i>	WE11: <i>Machine Learning/AI for Signal Processing</i>	WE12: <i>Bio Signal Processing</i>
15:15 - 15:45	Coffee Break			
15:45 - 17:30	SP.WE13: <i>Speech Processing</i>	SP.WE14: <i>Full Duplex Communications</i>	SP.WE15: <i>Security and privacy</i>	SP.WE16: <i>Quantum information technology</i>
17:45 - 18:45	<i>Social Event [JN Tata Auditorium]</i>			
19:00 - 21:00	<i>Conference Dinner [Main Guest House Lawns]</i>			
Thursday, July 19				
08:00 - 09:00	Registration for SPCOM 2018 at JN Tata Auditorium			
09:00 - 10:15	TH01: <i>Information Theory</i>	TH02: <i>Topics in Signal Processing</i>	TH03: <i>Machine Learning/AI and Applications</i>	TH04: <i>Cooperative and Visible Light Communications</i>
10:15 - 10:20	Break			
10:20 - 11:20	Plenary Talk by Prof. Volkan Cevher [JN Tata Auditorium]			
11:20 - 11:45	Coffee Break			
11:45 - 13:30	SP.TH05: <i>5G and next generation networking</i>	SP.TH06: <i>Mm-wave and THz systems</i>	SP.TH07: <i>Deep learning</i>	
13:30 - 14:30	Lunch			
14:30 - 16:00	<i>Graduation Day Event</i>			

PLENARY TALKS

Title: Learning from the sky: Autonomous flying access networks for beyond 5G

Speaker: David Gesbert

Professor and Head of the Communications Systems Department

EURECOM, Sophia Antipolis.

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Bio: David Gesbert (IEEE Fellow) is Professor and Head of the Communication Systems Department, EURECOM. He obtained the Ph.D degree from Ecole Nationale Supérieure des Telecommunications, France, in 1997. From 1997 to 1999 he has been with the Information Systems Laboratory, Stanford University. He was then a founding engineer of Iospan Wireless Inc, a Stanford spin off pioneering MIMO-OFDM (now Intel). Before joining EURECOM in 2004, he has been with the Department of Informatics, University of Oslo as an adjunct professor. D. Gesbert has published about 270

papers and 25 patents, some of them winning the 2015 IEEE Best Tutorial Paper Award (Communications Society), 2012 SPS Signal Processing Magazine Best Paper Award, 2004 IEEE Best Tutorial Paper Award (Communications Society), 2005 Young Author Best Paper Award for Signal Proc. Society journals, and paper awards at conferences 2011 IEEE SPAWC, 2004 ACM MSWiM. He was a Technical Program Co-chair for ICC2017 in Paris. He was named in the 2014 Thomson-Reuters List of Highly Cited Researchers in Computer Science.

He held visiting professor positions in KTH (2014) and TU Munich (2016). Since 2017 he is also a visiting Academic Master within the Program 111 at the Beijing University of Posts and Telecommunications as well as as a member in the Joint BUPT-EURECOM Open5G Lab.

Since 2015, he holds the ERC Advanced grant “PERFUME” on the topic of smart device Communications in future wireless networks.

Abstract: The use of flying robots (drones) carrying radio transceiver equipment is the new promising frontier in our quest towards ever more flexible, adaptable and spectrally efficient wireless networks. Beyond obvious challenges within regulatory, control, navigation, and operational domains, the deployment of autonomous flying radio access network (Fly-RANs) also come with a number of exciting new research problems such as the issue of autonomous real-time placement of the drones in non-trivial propagation scenarios (i.e. scenarios where the optimal placement is not just dictated by a trivial geometry or statistical argument due to shadowing effects, e.g. in cities). We present several different approaches, lying at the cross-roads between machine learning, signal processing and optimization. Some approaches involve the reconstruction of a city map from sampled radio measurements which can have application beyond the realm of communications.

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Title: Past, present, and future of polar coding

Speaker: Alexander Vardy

Jack K. Wolf Chair Professor

University of California San Diego.



Bio: Alexander Vardy was born in Moscow, U.S.S.R, and grew up in Israel. He graduated summa cum laude from the Technion – Israel Institute of Technology in 1985, and completed his Ph.D. in 1991 at the Tel Aviv University. He is currently the Jack Keil Wolf Endowed Chair Professor at the University of California San Diego, where he is affiliated with the Department of Electrical & Computer Engineering and the Department of Computer Science.

He received an IBM Invention Achievement Award in 1993, and NSF Research Initiation and CAREER awards in 1994 and 1995. In 1996, he was appointed Fellow in the Center for Advanced Study at the University of Illinois, and was named a Fellow of the David and Lucile Packard Foundation. He received the IEEE Information Theory Society Paper Award (jointly with Ralf Koetter) for the year 2004. In 2005, he received the Fulbright Senior Scholar Fellowship, and the Best Paper Award at the IEEE Symposium on Foundations of Computer Science (FOCS). In 2017, his work on polar codes was recognized by the the IEEE Communications & Information Theory Societies Joint Paper Award.

During 1995-1998, he was an Associate Editor for Coding Theory and during 1998-2001, he was the Editor-in-Chief of the IEEE Transactions on Information Theory. From 2003 to 2009, he was an Editor for the SIAM Journal on Discrete Mathematics. He is currently serving on the Executive Editorial Board for the IEEE Transactions on Information Theory. He has been a member of the Board of Governors of the IEEE Information Theory Society during 1998-2006, and again during 2011-2017. His research interests include error-correcting codes, algebraic and iterative decoding algorithms, lattices and sphere packings, coding for storage systems, as well as cryptography and computational complexity theory. He is a Fellow of the IEEE and the ACM.

Abstract: Polar coding, invented by Arikan ten years ago, is one of the most original and profound developments in coding theory to date. We will not attempt to summarize 10 years of polar coding in one talk. Instead, we hope this talk will provide a glimpse into several topics curated from the past, present, and future of polar codes. No prior knowledge of polar coding is assumed; we will begin with a brief tutorial on polarization theory and polar codes. We will then describe the list-decoding algorithm for polar codes, and how it is used in the 5G standard. We will also present our recent results on polar codes with large kernels. In particular, we will show that such codes not only approach capacity, but do so as fast as theoretically possible, at least on the binary erasure channel. Finally, if time permits, we will speculate on how polar codes can be used to correct synchronization errors, such as deletions and insertions.

Title: Trade-offs in resource constrained machine learning systems

Speaker: Volkan Cevher

Professor

Ecole Polytechnique Federale de Lausanne.



Bio: Volkan Cevher received the B.Sc. (valedictorian) in electrical engineering from Bilkent University in Ankara, Turkey, in 1999 and the Ph.D. in electrical and computer engineering from the Georgia Institute of Technology in Atlanta, GA in 2005. He was a Research Scientist with the University of Maryland, College Park from 2006-2007 and also with Rice University in Houston, TX, from 2008-2009. Currently, he is an Associate Professor at the Swiss Federal Institute of Technology Lausanne and a Faculty Fellow in the Electrical and Computer Engineering Department at Rice University. His research interests include signal processing theory, machine learning, convex optimization, and information theory. Dr. Cevher was the recipient of the IEEE Signal Processing Society Best Paper Award in 2016, a Best Paper Award at CAMSAP in 2015, a Best Paper Award at SPARS in 2009, and an ERC CG in 2016 as well as an ERC StG in 2011.

Abstract: Massive data poses a fundamental challenge to learning algorithms, which is captured by the following computational dogma: the running time of an algorithm increases with the size of its input data. The available computational power, however, is growing slowly relative to data sizes. Hence, large-scale machine learning problems of interest require increasingly more time to solve.

Our research demonstrates that this dogma is false in general, and supports an emerging perspective in computation: data should be treated as a resource that can be traded off with other resources, such as running time. For data acquisition and communications, we have also shown related sampling, energy, and circuit area trade-offs.

This talk will summarize our work confronting these challenges by building on the new mathematical foundations on how we generate data via sampling, how we set up learning objectives that govern our fundamental goals, and how we optimize these goals to obtain solutions and to make optimal decisions. We then demonstrate task-specific, end-to-end trade-offs (e.g., samples, power, computation, storage, and statistical precision) in broad domains.

TUTORIALS

Teasing out the multi-scale representational space of cross-modal speech perception: Methods and mechanisms

Speaker: Arpan Banerjee

National Brain Research Center, India



Bio: Arpan Banerjee received his PhD in Complex Systems and Brain sciences from Florida Atlantic University, USA primarily working in the area of bimanual motor coordination in humans. He has completed his post-PhD training at Center for Neural Sciences, New York University and The National Institutes of Health, USA working in signal processing and spike train, LFP and MEG recordings. Currently his interests are in using computational neuroscience and multimodal brain imaging EEG/MEG/ fMRI to understand accurately where (spatial) and when (temporal) task-related differences in information processing occur in the brain during multisensory integration, higher

order visual processing and cognition. The key research question that he wants to address is how large networks of neurons coordinate amongst each other to form organized assemblies at only specific instants of time to orchestrate ongoing behavior. Demystifying the tunes that govern this neural orchestra will shed light to subtle differences in human brain function across normal individuals, across patients and eventually lead to developing neuro-markers for spectrum disorders such as autism.

Abstract: Multisensory integration has excited a large group of researchers from psychologists, computer scientists, neurophysiologists and finally neuroimaging community and triggered a wide body of research. Yet, the representational space of multisensory processing such as during cross-modal speech perception remains elusive. In this talk I would like to delimit the boundaries of this representational space using the results obtained from multimodal neuroimaging techniques, EEG and fMRI.

In the first part of this talk I will talk about network analysis tools that are currently used in the literature for analysis of EEG/ MEG and functional MRI data. Network methods have become an important tool to identify and characterize neural mechanisms of various cognitive process as well as quantifying neurological and neuropsychiatric disorders. I will also present some existing issues with EEG/ MEG source analysis techniques and discuss the use of these methods with empirical data sets. I will talk about neurobiologically realistic modeling tools using dynamic systems theory. Thereafter I will illustrate how the latter approach is important in interpreting the outcome of network analysis tools in particular validation of ground truth.

In the second part of the talk, I would talk about a behavioral paradigm with which we have been able to track cross-modal speech perception using psychophysical control parameters such temporal ordering of audio-visual stimulus. Using EEG and fMRI recordings on human volunteers, I will illustrate how the spatiotemporal functional network patterns can be used to understand the processing of behavior. Finally I would present a computational model inspired by neurobiologically realistic parameters that attempts to link the behavioral results with patterns of activity observed in neuroimaging recordings. The overarching goal of the talk is to build a mechanistic understanding of the neural dynamics observed at individual brain regions and across a functional network comprised of multiple brain areas underlying speech perception.

PCA and Robust PCA for Modern Datasets

Speaker: Namrata Vaswani

Iowa State University, USA



Bio: Namrata Vaswani is a Professor of Electrical and Computer Engineering, and (by courtesy) of Mathematics, at Iowa State University. She received a Ph.D. in 2004 from the University of Maryland, College Park and a B.Tech. from Indian Institute of Technology (IIT-Delhi) in India in 1999. Her research interests lie at the intersection of statistical machine learning / data science, computer vision, and signal processing. She is a recipient of the Harpole-Pentair Assistant Professorship and the Iowa State Early Career Engineering Faculty Research Award at Iowa State. In 2014, she received the IEEE Signal Processing Society (SPS) Best Paper Award for her Modified-CS work that was co-authored with her graduate student Lu in the IEEE Transactions on Signal Processing in 2010. Vaswani has

served the SPS and IEEE in various capacities. She is an Area Editor for IEEE Signal Processing Magazine and has served twice as an Associate Editor for IEEE Transactions on Signal Processing. She is the Lead Guest Editor for a Proceedings IEEE Special Issue on Rethinking PCA for Modern Datasets, and of a Signal Processing Magazine Feature Cluster on Exploiting Structure in High-dimensional Data Recovery, both of which will appear in 2018. She is also the Chair of the Women in Signal Processing (WiSP) Committee, a steering committee member of SPS's Data Science Initiative, and an elected member of the SPTM and IVMSM Technical Committees.

Abstract: In today's big data age, there is a lot of data generated everywhere around us. Examples include texts, tweets, network traffic, changing Facebook connections, or video surveillance feeds coming in from one or multiple cameras. Before processing any big dataset, the first step is to perform dimension reduction and noise/outlier removal. Traditionally, dimension reduction is done by solving the principal components' analysis (PCA) problem. While this is a very old problem, many of the traditional techniques fail if the data is corrupted by anything other than small and uncorrelated noise. PCA and robust PCA and their streaming counterparts have a very large number of applications since dimension reduction is a key first step in a very large variety of applications. Some examples include exploratory data analysis, video analytics, recommendation system design, and many more.

We will begin with a brief introduction to the basic random matrix theory results needed by some of the theoretical guarantees that will be discussed (depending on audience background and interest). Most of the tutorial will talk about the original PCA problem; about PCA when data and noise are correlated (correlated-PCA); and about PCA in the presence of large but structured, e.g., sparse, noise (robust PCA). Moreover, because all the data cannot be stored, or because there is a need to make decisions in real-time, and/or because the structure of the data could itself change significantly over time, there is a lot of interest in streaming algorithms for PCA or robust PCA and their dynamic (tracking) counterparts. About half of the tutorial will talk about old and new approaches to streaming PCA and streaming dynamic robust PCA. PCA has been a problem that has been studied for almost a century dating back to the work of Hotelling from the 1930s among others. However, the correlated-PCA problem has received almost no attention until very recently. Robust PCA has also been studied for a few decades. However, the new series of works on provably correct and practically usable robust PCA started appearing in 2011 and later. The work on provably correct streaming or dynamic robust PCA techniques only started appearing in 2014 and later. There has been older work on streaming or online PCA, but there has been much a renewed interest in recent years on online PCA, streaming (memory-optimal single pass) solutions for PCA, and on fast algorithms for partial SVD.

5G: An Evolution Towards a Revolution

Speaker: Karthik Sundaresan

NEC Laboratories America, USA



Bio: Karthik Sundaresan is a senior researcher in the mobile communications and networking research department at NEC Labs America. His research interests are broadly in wireless networking and mobile computing, and span both algorithm design as well as system prototyping. He is the recipient of ACM Sigmobile's Rockstar award (2016) for early career contributions to the field of mobile computing and wireless networking, as well as several best paper awards at prestigious ACM and IEEE conferences. He holds over thirty patents and received a business contribution award from NEC for the technology commercialization of an LTE small-cell interference management technology. He has participated in various organization roles for IEEE and ACM conferences,

and served as the PC co-chair for ACM MobiCom'16. He is a senior member of IEEE and currently serves as an associate editor for IEEE Transactions on Mobile Computing.

Abstract: The aim of this tutorial is to give the audience an overview of the landscape of the future generation of mobile networks, namely 5G. Contrary to popular view, 5G is not expected to be anchored on a single disruptive technology but rather supported by an amalgamation of multiple technologies. In essence, it is an evolution of several key technical advancements, whose synergy is expected to revolutionize the heterogeneity of use cases that can be "simultaneously" enabled by a single network. Such use cases range from throughput-focused mobile broadband (Gigabit peak rates) to latency/reliability-focused mission critical (e.g. augmented/virtual reality, autonomous driving) and density-focused massive connection (IoT) services.

While physical layer advancements in the form of New Radio (NR) are an integral part of 5G, realizing the diverse use cases envisioned, will equally require innovation and flexible orchestration of its access, network and computing layers as well. This tutorial will provide an overview of some of these innovative ingredients that will constitute 5G, from the perspective of not just radio access network, but also core network and services/applications. It will cover topics ranging from communication and networking to architectural designs, automation and use cases, including but not limited to

1. Radio: new radio (NR), mmWave, flexible OFDM numerology, advanced coding
2. Access: IoT-optimized access, hybrid access (licensed, shared and unlicensed spectrum)
3. Network: cloud deployments, virtualization and network slicing
4. Computing: network function virtualization, scalable core design, mobile edge computing
5. Automation: network access, provisioning and management
6. Case studies: Augmented reality over LTE networks, self-configuring UAV-based LTE networks

Introduction to Reinforcement Learning

Speaker: Harm van Seijen

Microsoft Research, Montreal, Canada



Bio: Harm van Seijen is the research manager of the reinforcement learning team at Microsoft Research, Montreal. His work focuses on fundamental challenges in reinforcement learning. He obtained his PhD in 2011 from the University of Amsterdam on the topic of reinforcement learning under space and time constraints. Prior to his position at Microsoft, he was a Postdoctoral Fellow at the University of Alberta, working together with Professor Richard Sutton on novel reinforcement-learning methods, and was affiliated with the startup company Maluuba.

Abstract: This talk will give an overview of reinforcement learning, a machine learning approach to learn optimal behavior that has gained a lot of traction in the last few years. In the reinforcement-learning setting, an agent interacts with an initially unknown environment and tries to maximize the total reward it receives via a trial-and-error process. By using deep neural networks as internal representation, reinforcement learning methods have become substantially more powerful in recent years, achieving above-human performance on many challenging tasks, from robotic control to the ancient game of Go. We discuss the basic theory of reinforcement learning and the relation with other popular machine learning approaches. Furthermore, we will discuss recent results, as well as remaining challenges and active areas of research.

Need for Low Power Communications and Localization

Speaker: Dinesh Bharadia

University of California San Diego, USA



Bio: Dinesh Bharadia is faculty in ECE at University of California San Diego. Prior to UCSD, Dinesh Bharadia received his Ph.D. from Stanford University was a Postdoctoral Associate at MIT. Specifically, in his dissertation, he built the prototype of a radio, that invalidated a long-held assumption in wireless is that radios cannot transmit and receive at the same time on the same frequency. In recognition of his work, Dinesh was named to Forbes 30 under 30 for the science category worldwide list. Dinesh was named a Marconi Young Scholar for outstanding wireless research and awarded the Michael Dukakis Leadership award. He was named as one of the top 35 Innovators under 35 in the world by MIT Technology Review in 2016. He is a recipient of the Sarah and Thomas Kailath Stanford Graduate Fellowship. From 2013 to 2015, he was a

Principal Scientist for Kumu Networks, where he worked to commercialize his research on full-duplex radios, building a product that underwent successful field trials at Tier 1 network providers worldwide like Deutsche Telekom and SK Telecom. This product is currently under deployment. His research interests include advancing the theory and design of modern wireless communication systems, wireless imaging, sensor networks and data-center networks.

Abstract: Low Power communication and localization has applications in sensing and measuring of our environment, to building smart cities and smart transportation systems and so on. In this tutorial, I would present a communication and localization system which can connect to existing WiFi infrastructure while using low power backscatter techniques. Specifically, I would elaborate use of network coding principles to build the above communication system. I would show a real-time demonstration of the low power system using an embedded systems platform built during the project.

Video Streaming: On Rate-Adaptation, Multipath, Virtual Reality, and Content Distribution Network

Speaker: Vaneet Aggarwal

Purdue University, USA



Bio: Vaneet Aggarwal received the B.Tech. degree in 2005 from the Indian Institute of Technology, Kanpur, India, and the M.A. and Ph.D. degrees in 2007 and 2010, respectively from Princeton University, Princeton, NJ, USA, all in Electrical Engineering.

He is currently an Assistant Professor at Purdue University, West Lafayette, IN (2015-current) and a VAJRA Adjunct Professor at IISc Bangalore (2018-current). Prior to this, he was a Senior Member of Technical Staff Research at AT&T Labs-Research, NJ (2010-2014), and an Adjunct Assistant Professor at Columbia University, NY (2012-2014). He is an IEEE Senior Member (2015-current). His current research interests are in communications and networking, video streaming, cloud computing, and machine learning.

Dr. Aggarwal is on the editorial board of the IEEE Transactions on Communications and the IEEE Transactions on Green Communications and Networking. He was the recipient of Princeton University's Porter Ogden Jacobus Honorific Fellowship in 2009, the AT&T Key Contributor award in 2013, AT&T Vice President Excellence Award in 2012, and AT&T Senior Vice President Excellence Award in 2014. He was also the recipient of the 2017 Jack Neubauer Memorial Award, recognizing the Best Systems Paper published in the IEEE Transactions on Vehicular Technology.

Abstract: Mobile video has emerged as a dominant contributor to cellular traffic. It already accounts for around 40-55 percent of all cellular traffic and is forecast to grow by around 55 percent annually through 2021. While its popularity is on the rise, delivering high quality streaming video over cellular networks remains extremely challenging. In particular, the video quality under challenging conditions such as mobility and poor wireless channel is sometimes unacceptably poor. Almost every viewer at some point in time can relate to experiences of choppy videos, stalls, etc. This tutorial aims to provide fundamental approaches to improve the quality of experience (QoE) for video viewing at the end users.

Not surprisingly, a lot of attention from both research and industry in the past decade has focused on the development of adaptive streaming techniques for video on demand that can dynamically adjust the quality of the video being streamed to the changes in network conditions. In this tutorial, we will start with explaining the basics of adaptive bit-rate video streaming, and some of the existing algorithms. Further, we will theoretically formulate the problem of adaptive video streaming with the knowledge of future bandwidth. The non-convex integer-constrained streaming problem will be showed to be solvable optimally in linear time complexity, giving a new class of algorithms in combinatorial optimization which in complexity class P. The algorithms can be extended to window-based online mechanisms, with harmonic mean or crowd-sourced imperfect bandwidth prediction. Results over a realistic testbed will also be demonstrated. Further extensions to multiple paths, and link preference (eg. WiFi over LTE) will be provided.

The 360-degree technology is shaping the video industry. 360-degree videos provide users a panoramic view creating a unique viewing experience. 360-degree videos, also known as immersive

or spherical videos, are essential parts of the virtual reality (VR) which are changing the user's experience of video streaming. VR is projected to form a big market of \$120 billion by 2020. 360-degree videos are very popular on major video platforms such as YouTube, Facebook. However, the current popular technologies for streaming try to fetch the all the portion of the chunk in the same quality including both the visible and invisible portions. Though this method is simple, it has some disadvantages. For example, the bandwidth utilization is high as the chunks in the 360-degree videos are of larger sizes compared to the traditional ones. Thus, if the network is congested or the bandwidth is low, it will lead to a poor-quality video. Hence, without smart algorithms, it can easily consume the wireless bandwidth. Even the wireline capacity may not be enough for such 360-degree videos. We will provide the challenges in designing bandwidth-efficient streaming algorithm for 360-degree videos for maximizing the quality of service (or quality of experience) of the users. Such approaches use head movement prediction, which brings new challenges in addition to the bandwidth prediction.

So far, we considered the aspect of the last hop, which is wireless. In the final part, we will present the network side of the video transfer. The network designers can only control the wired part. With the same network controlling multiple users, the network becomes a bottleneck. We will provide a holistic framework considering the multiple network control knobs to optimize delivery from the network. Over-the-top video streaming, e.g., Netflix and YouTube, has been dominating the global IP traffic in recent years. The traffic will continue to grow due to the introduction of even higher resolution video formats such as 4K on the horizon. As end-users consume video in massive amounts and in an increasing number of ways, service providers need flexible solutions in place to ensure that they can deliver content quickly and easily regardless of their customer's device or location. More than 50% of over-the-top video traffic is now delivered through content distribution networks (CDNs). Even though multiple solutions have been proposed for improving congestion in the CDN system, managing the ever-increasing traffic requires a fundamental understanding of the system and the different design flexibilities (control knobs) to make the best use of the hardware limitations. The service providers typically use two-tiered caching approach to improve the streaming service. In addition to the distributed cache servers provided by the CDN, the edge router can also have a cache. The different control knobs include the choice of distributed server, caching, queue management, etc., to optimize the end user QoE.

SESSION DETAILS

Tuesday, July 17

Tuesday, July 17, 08:00 – 09:00 Registration for SPCOM 2018 at JN Tata Auditorum

Tuesday, July 17, 09:00 – 09:15 Conference Inauguration [JN Tata Auditorium]

Tuesday, July 17, 09:15 - 10:30

TU01: Coding for Data Communications and Storage

9:15 *On the Exact Rate-Memory Trade-off for Multi-access Coded Caching with Uncoded Placement*

Srinivas Reddy Kota (Indian Institute of Technology, Bombay, India); Nikhil Karamchandani (Indian Institute of Technology Bombay, India)

9:33 *Stall-Quality Tradeoff for Cloud-based Video Streaming*

Abubakr O. Al-Abbasi and Vaneet Aggarwal (Purdue University, USA)

9:52 *A Novel Truncation Rule for the EMS Decoding of Non-binary LDPC Codes*

Kuntal Deka (IIIT Guwahati, India); Alentattil Rajesh (IIT G, India); Prabin Kumar Bora (Indian Institute of Technology, India)

10:11 *Locality and Availability with Multiple Erasure Correction*

Ujwal Deep Kadiyam (Indian Institute of Technology Guwahati, India)

TU02: Audio and Speech Recognition and Classification

9:15 *Exploring the Role of Speaking-Rate Adaptation on Children's Speech Recognition*

Syed Shah Nawazuddin (National Institute of Technology Patna, India); Hemant Kathania (NIT Sikkim, India); Chaman Singh (National Institute of Technology Patna, India); Waquar Ahmad (National Institute of Technology Sikkim, India); Gayadhar Pradhan (NIT Patna, India)

9:33 *Proportionate Subband Filtering Technique with L1-Norm for Feedback Cancellation in Hearing Aids*

Vasundhara Vasundhara (IIT Bhubaneswar, India); Niladri Puhan and Ganapati Panda (Indian Institute of Technology Bhubaneswar, India)

9:52 *Poetic Meter Classification Using Acoustic Cues*

Rajeev Rajan (Rajiv Gandhi Institute of Technology Kottayam Kerala India); Anu Raju (Rajiv Gandhi Institute of Technology, Kottayam, India)

10:11 *Classification of Story-Telling and Poem Recitation Using Head Gesture of the Talker*

Anurag Das, Prasanta Ghosh and Valliappan CA (Indian Institute of Science, India)

TU03: Optical Communications and Networks

9:15 *A Novel Protection Strategy for Elastic Optical Networks Based on Space Division Multiplexing*

Sridhar Iyer (Jain College of Engineering, India); Shree Prakash Singh (NSIT, India)

9:33 *Limited Feedback and Interpolation of Principal Modes in Spatially Multiplexed WDM Fiber Links*

Jinesh C Jacob and Kumar Appaiah (Indian Institute of Technology Bombay, India)

9:52 *Utility of Delayed CSI Feedback in Mode Division Multiplexed Multimode Fiber Links*

Rohan Prasad (Indian Institute of Technology Bombay, India); Kumar Appaiah (Indian Institute of Technology Bombay, India)

10:11 *Demonstration of Polarization Diversity Based SH-QPSK System with PSK Modulated Carrier*

Rashmi Kamran (IIT Mumbai, India); Shalabh Gupta (IIT Bombay, India)

TU04: Compressive Sensing and Applications

9:15 *Sinusoid Signal Estimation Using Generalized Block Orthogonal Matching Pursuit Algorithm*
Manoj A (Indian Institute of Technology Madras, India); Arun Pachai Kannu (IIT Madras, India)

9:33 *Binary Compressive Sensing and Super-Resolution with Unknown Threshold*
Subhadip Mukherjee, Anjany Kumar Sekuboyina and Chandra Sekhar Seelamantula (Indian Institute of Science, India)

9:52 *A Singular Value Relaxation Technique for Learning Sparsifying Transforms*
Subhadip Mukherjee and Chandra Sekhar Seelamantula (Indian Institute of Science, India)

10:11 *A Low Complexity Orthogonal Least Squares Algorithm for Sparse Signal Recovery*
Samrat Mukhopadhyay (Indian Institute of Technology, Kharagpur, India); Siddhartha Satpathi (University of Illinois, USA); Mrityunjy Chakraborty (Indian Institute of Technology, Kharagpur, India)

Tuesday, July 17, 10:30 – 11:00 *Coffee Break*

Tuesday, July 17, 11:00 – 12:00

11:00 Plenary Talk by Prof. Alexander Vardy : Past, present, and future of polar coding

Tuesday, July 17, 12:00 – 12:15 *Break*

Tuesday, July 17, 12:15 - 13:15

TU05: Cognitive Radio

12:15 *On Outage Secrecy Minimization Using Jammer Selection in Energy Harvesting Cognitive Radio*

Avik Banerjee and Santi Prasad Maity (Indian Institute of Engineering Science and Technology, Shibpur, India); Ritesh Das (Indian Institute Of Engineering Science and Technology, India)

12:35 *Optimal Power Allocation for Multicasting in Multiple Antenna Cognitive Radio Networks*
Sangeeta Bhattacharjee (Indian Institute of Engineering Science and Technology, Shibpur, India); Tamaghna Acharya (Indian Institute of Engineering Science and Technology Shibpur, India); Uma Bhattacharya (Bengal Engineering & Science University, Shibpur, India)

12:55 *Preventing Collusion Attacks in Cooperative Spectrum Sensing*
Shivanshu Shrivastava (Indian Institute of Technology Kanpur, India)

TU06: Applications of Audio and Speech Processing

12:15 *Processing Linear Prediction Residual Signal to Counter Replay Attacks*
Jagabandhu Mishra, Madhusudan Singh and Debadatta Pati (National Institute of Technology Nagaland, India)

12:35 *Detecting Developmental Dysphasia in Children Using Speech Data*

Ramarao D , Chaman Singh and Syed Shahnawazuddin (National Institute of Technology Patna, India); Nagaraj Adiga (Indian Institute of Technology Guwahati, India); Gayadhar Pradhan (NIT patna, India)

12:55 *Hypernasality Detection Using Zero Time Windowing*

Akhilesh Dubey (Indian Institute of Technology, Guwahati, India); S. R. Mahadeva Prasanna (Indian Institute of Technology Guwahati, India); Samarendra Dandapat (IITG, India)

TU07: RF Systems for Communication - 1

12:15 *Novel Approach for Enhanced Reduction of SAR in a Mobile Phone Antenna Using High Impedance FSS*

Adeline Mellita and Chandu DS (Indian Institute of Information Technology Design and Manufacturing, India); Sholampettai Subramanian Karthikeyan (IIITDM, Kancheepuram, India)

12:35 *A Novel Circular Quarter-Mode SIW Cavity-Backed Diversity Antenna with Dual-Circular Polarization*

Chandu DS (Indian Institute of Information Technology Design and Manufacturing, India); Tharani D (IIITDM Kancheepuram, India); Sholampettai Subramanian Karthikeyan (IIITDM, Kancheepuram, India)

12:55 *Design of Substrate Integrated Coaxial Line (SICL) Fed Planar Quasi-Yagi Antenna for Millimeter Wave Application*

Naman Baghel and Soumava Mukherjee (Indian Institute of Technology Jodhpur, India)

TU08: Energy Harvesting Communication Systems

12:15 *Performance of a Cooperative Network with Direct Link and an Energy-Buffer Aided Relay*
Dileep Bapatla (Indian Institute of Technology Delhi, India); Shankar Prakriya (Indian Institute of Technology, Delhi, India)

12:35 *On Outage Analysis in Cooperative Cognitive Radio Network with RF Energy Harvesting*
Sutanu Ghosh (Indian Institute of Engineering Science and Technology & JIS GROUP, India); Tamaghna Acharya (Indian Institute of Engineering Science and Technology Shibpur, India); Santi Prasad Maity (Indian Institute of Engineering Science and Technology, Shibpur, India)

12:55 *Optimal Harvest-or-Transmit Strategy for Energy Harvesting Underlay Cognitive Radio Network*

Kalpant Pathak (Indian Institute of Technology Kanpur, India); Adrish Banerjee (Indian Institute of Technology, Kanpur, India)

Tuesday, July 17, 13:15 – 14:15 Lunch

Tuesday, July 17, 14:15 - 15:30

TU09: RF Systems for Communication - 2

14:15 *Cross-Polarization Reduction of a Cylindrical Dielectric Resonator Antenna with Parasitic Strip Loading*

Praveen Kumar AV and Anuj Ojha (BITS Pilani Rajasthan, India)

14:33 *Slot Antenna Miniaturization with Equal Electrical Path Length Using Different Shape of Loops*

Sk. Moinul Haque (Aliah University, India); Khan Masood Parvez (Aliah University, India)

14:52 *Copper Coin Loaded Miniaturized Slot Antenna*

Khan Masood Parvez (Aliah University, India); Sk. Moinul Haque (Aliah University, India);
Enamul Khan (Aliah University, India)

15:11 *Design of Wideband Coaxial-to-Substrate Integrated Coaxial Line (SICL) Planar Transition*
Satya Krishna Idury and Soumava Mukherjee (Indian Institute of Technology Jodhpur, India)

TU10: Audio and Speech Processing - 1

14:15 *Instantaneous Fundamental Frequency Estimation of Speech Signals Using tunable-Q Wavelet Transform*

Anurag Nishad and Ram Bilas Pachori (Indian Institute of Technology Indore, India)

14:33 *Enhanced Directional Sensitivity Using Acoustic Dish Reflector*

Sawant Vilas (IISc Bangalore, India); Anirban Bhowmick (IISc Bangalore, India); Thippur V. Sreenivas (Indian Institute of Science, India)

14:52 *Excitation Source Feature for Discriminating Shouted and Normal Speech*

Shikha Baghel (Indian Institute of Technology, Guwahati, India); S. R. Mahadeva Prasanna (Indian Institute of Technology Guwahati, India); Prithwjit Guha (IIT Guwahati, India)

15:11 *Frequency Contour Modeling to Synthesize Natural Flute Renditions for Carnatic Music*

Pranav Prasad, Anand Ashtamoorthy and Shashank Dhar (National Institute of Technology Karnataka, Surathkal, India); Deepu Vijayaseenan (NITK, India)

TU11: Image and Video Signal Processing

14:15 *Fast Non-local Means Denoising for MR Image Sequences*

Hemalata Bhujle (SDM College of Engineering & Technology, Dharwad, India); Basavaraj Vadavadagi (SDM College of Engineering & Technology, Dharwad, India)

14:33 *Diagnostic Information Based Super-Resolution of Retinal Optical Coherence Tomography Images*

Vineeta Das (Indian Institute of Technology, Guwahati, India); Samarendra Dandapat (IITG, India); Prabin Kumar Bora (Indian Institute of Technology Guwahati, India)

14:52 *Object-based Compression of 3D Animation Geometry*

Sanjib Das and Prabin Kumar Bora (Indian Institute of Technology Guwahati, India)

15:11 *Learning Representations with Strong Supervision for Image Search*

Konda Reddy Mopuri (Indian Institute of Science Bangalore, India); Vishal Athreya Baskaran (PayPal Inc & Birla Institute of Technology and Science Hyderabad, India); Venkatesh Babu Radhakrishnan (Indian Institute of Science, India)

TU12: Signal Processing Algorithms and Architecture

14:15 *Time-Frequency Analysis of Gravitational Waves*

Pushpendra Singh (Bennett University, Greater Noida & Indian Institute of Technology, Delhi, India); Amit Singhal (JIIT, India); Shiv Dutt Joshi (Indian Institute of Technology, Delhi, India)

14:33 *A Novel Recursive Filter Realization of Discrete Time Filters*

Ganesan Thiagarajan, Joydeep Bhattacharya, Srinivasan Bhuramoorthy and Ashwini Kamate (MMRFIC Technology Pvt. Ltd, India)

14:52 *A Novel Weight Window Design Approach*

Sachin Bharadwaj (IISc, India); Sriram Murali (Texas Instruments India, India)

15:11 *A Novel Scaling Criterion for Optimal Trade-off Between Time and Frequency Resolution in S-transform*

Neha Singh (Indian Institute of Technology, Roorkee, India); Pyari Mohan Pradhan (Indian Institute of Technology (IIT) Roorkee, India)

Tuesday, July 17, 15:30 – 16:00 Coffee Break

Tuesday, July 17, 16:00 - 17:45

SP.TU13: Full Duplex and LPWAN

- 16:00 *QoS-Constrained Energy-Efficient AF Two-Way Full-Duplex Relaying with Massive Antennas*
Ekant Sharma (Indian Institute of Technology, Kanpur, India); Rohit Budhiraja (IIT Kanpur, India)
- 16:26 *Full Duplex Wireless: A solution for next generation or not yet?*
Dinesh Bharadia (University of California San Diego)
- 16:52 *Recent Developments in IOT: A system perspective*
Ganesan Thiagarajan (MMRFIC Technology Private Limited, Bangalore)
- 17:18 *Compressed Sensing Based Uncoordinated and Unsourced Multiple Access*
Jean-Francois Chamberland-Tremblay (Texas A&M University)

SP.TU14: Caching in cellular networks

- 16:00 *Content Caching and Delivery with Partial Adaptive Matching*
Nikhil Karamchandani (Indian Institute of Technology, Bombay, India)
- 16:26 *Approximate optimality of separation in cache-aided wireless interference networks.*
Suhas Diggavi (University of California, Los Angeles)
- 16:52 *Coded Caching Schemes with Reduced Subpacketization from Linear Block Codes*
Aditya Ramamoorthy (Iowa State University)
- 17:18 *Caching in Cellular Networks: A Learning Theoretic Perspective*
Bharath N. Bettagere (IIT Dharwad)

SP.TU15: Computational Imaging

- 16:00 *Structured low-rank algorithms: a novel framework for super-resolution recovery of curves and images*
Mathews Jacob (University of Iowa)
- 16:26 *Solving Inverse Computational Imaging Problems using Deep Pixel-level Priors*
Kaushik Mitra (IIT Madras)
- 16:52 *SPToF: Signal processing for Time-of-Flight cameras*
Adithya Pediredla (Rice University)
- 17:18 *Sparsity Assisted Optical Phase Imaging*
Kedar Khare (IIT Delhi)

SP.TU16: Estimation and information theory

- 16:00 *Proving strong converse is difficult?*
Shun Watanabe (Tokyo University of Agriculture and Technology)
- 16:26 *Secret Sharing for Secure and Private Distributed Coded Computation.*
Salim El Rouayheb (Rutgers University)
- 16:52 *Gaussian Process bandits with adaptive discretization.*
Tara Javidi (University of California San Diego)
- 17:18 *Estimation of discrete distributions under local differential privacy*
Alexander Barg (University of Maryland)

Wednesday, July 18

Wednesday, July 18, 08:00 – 09:00 Registration for SPCOM 2018 at JN Tata Auditorum

Wednesday, July 18, 09:00 - 10:15

WE01: Wireless, Vehicular and Smart Grid Networks

9:00 *Age-of-Information Aware Scheduling*

Prakirt Raj Jhunjhunwala (Indian Institute of Technology, Bombay, India); Sharayu Moharir (Indian Institute of Technology Bombay, India)

9:18 *Platform Competition for Throughput in Two-sided Freelance Markets*

Mansi Sood, Ankur A. Kulkarni and Sharayu Moharir (Indian Institute of Technology Bombay, India)

9:37 *Routing and Scheduling Transient Flows for QoS in Multi-hop Wireless Networks*

Vinay Siram (Indian Institute of Science, Bangalore, India); Karthikeshwar Varma Dasaraju and Prakash Barman (Indian Institute of Science, India); Surekha Yellisetty (Mediatek Bangalore Pvt Ltd, India); Padma Desiraju and Saurabh Mandal (CAIR & DRDO, India); Suvina M Vijayan (CAIR, DRDO, India); Prakash Chand (DRDO, India); Utpal Mukherji and Vinod Sharma (Indian Institute of Science, India)

9:56 *Menu-Based Pricing for Profitable Electric Vehicle Charging with Vehicle-to-Grid Service*

Arnob Ghosh (Purdue University & University of Pennsylvania, USA); Vaneet Aggarwal (Purdue University, USA)

WE02: Speech Recognition

9:00 *Enhancing Pitch Robustness of Speech Recognition System Through Spectral Smoothing*

Bandarupalli Tarun Sai, Ishwar Chandra Yadav and Syed Shahnawazuddin (National Institute of Technology Patna, India); Gayadhar Pradhan (NIT patna, India)

9:18 *Some Experiments on Context Mismatched Speech Recognition*

Abhishek Dey (GUIST Gauhati University, India); Syed Shahnawazuddin (National Institute of Technology Patna, India); Rohit Sinha (Indian Institute of Technology Guwahati, India)

9:37 *Detection of Vowel Offset Points Using Non-Local Similarity Between Speech Samples*

Avinash Kumar (NIT patna, India); Syed Shahnawazuddin (National Institute of Technology Patna, India); Gayadhar Pradhan (NIT patna, India)

9:56 *Improving Children's Speech Recognition Through Time Scale Modification Based Speaking Rate Adaptation*

Hemant Kathania (NIT Sikkim, India); Syed Shahnawazuddin (National Institute of Technology Patna, India); Waqar Ahmad (National Institute of Technology Sikkim, India); Nagaraj Adiga (University of Crete, India); Sanjay Jana (NIT SIKKIM, India); Arun Samaddar (Director, India)

WE03: OFDM and Multicarrier Techniques

9:00 *Non-orthogonal Transmultiplexers for FBMC with Controlled ISI*

Arjun R and Ashish Sukhwani (IIT Bombay, India); Kumar Appaiah (Indian Institute of Technology Bombay, India); Vikram M. Gadre (IIT Bombay, India)

9:18 *Iterative Channel and Symbol Estimation for OFDM and for SIMO Diversity*

Yash Vasavada (Dhirubhai Ambani Institute of Information and Communication Technology, India); Jeffrey Reed (Virginia Tech, USA); A. A. (Louis) Beex (DSPRL - Wireless@VT & Virginia Tech, USA)

9:37 *Time-domain Complexity Analysis of Impulse Noise Sources for xDSL/PLC Systems*
Neelima Singh (IIT Delhi, New Delhi, India); Brejesh Lall (Indian Institute of Technology Delhi, India)

9:56 *Multiplexing Reference Signals and Data in a DFT-s-OFDM Symbol*
Chandrashekhara Thejaswi Pataguppe Suryanarayan Bhat (Samsung R&D Institute India, Bangalore, India); SaiDhiraj Amuru (Samsung, India); Jinesh P Nair (Nokia Networks, India); Atanu Guchhait (Samsung R&D Institute India - Bangalore, India)

WE04: VLSI for Communication and Signal Processing

9:00 *Floorplan Based Performance Evaluation of 3D Variants of Mesh and BFT Networks-on-Chip*
Bheemappa Halavar (National Institute of Technology Karnataka Mangalore, India);
Basavaraj Talawar (National Institute of Technology Karnataka, India)

9:20 *Low Complexity Algorithm for Multi-path Video Streaming*
Anis Elgabli, Vaneet Aggarwal and Ke Liu (Purdue University, USA)

9:40 *Affine Boolean Classification with FPGA Implementation on Secret Image Sharing*
Tapasi Bhattacharjee (WBUT, India); HIRAK MAITY (College of Engineering and Management, Kolaghat, India); Santi Prasad Maity (Indian Institute of Engineering Science and Technology, Shibpur, India)

Wednesday, July 18, 10:15 – 10:45 Coffee Break

Wednesday, July 18, 10:45 – 11:45

10:45 Plenary Talk by Prof. David Gesbert : *Learning from the sky: Autonomous flying access networks for beyond 5G*

Wednesday, July 18, 11:45 – 12:00 Break

Wednesday, July 18, 12:00 - 13:00

WE05: NB-IoT

12:00 *Reference Signals Based Time and Frequency Tracking in NB-IoT*
Sriharsha Magani and Kiran Kuchi (IIT Hyderabad, India)

12:20 *Digital Predistortion for Narrowband IoT Applications*
Yuva Kumar (Keio University, Japan); Seetharam Kashyap and Sreenath Ramanath (Lekha Wireless Solutions, India)

12:40 *Low Complexity ML Synchronization for 3GPP NB-IoT*
Sripada Kadambar (Samsung R&D Institute India - Bangalore, India); Ashok Kumar Reddy Chavva (Samsung Electronics, India)

WE06: Spoken Language Processing

12:00 *A Novel Approach for Effective Recognition of the Code-Switched Data on Monolingual Language Model*
Ganji Sreeram (IIT Guwahati, India)

12:20 *An SVD Based Approach for Spoken Language Identification*
Manish Jain and Malarvizhi Sundaresan Saranya (Indian Institute of Technology, Madras, India); Hema A Murthy (Indian Institute of Technology Madras, India)

12:40 *Enhancement of Bone Conducted Speech Signal by Wavelet Transform*

Premjeet Singh (Birla Institute of Technology Mesra, India); Manoj Mukul (Birla Institute of Technology Mesra Ranchi India); Rajkishore Prasad (BN College Patna india)

WE07: Forensics and Security

- 12:00 *DeepPalm- A Unified Framework for Personal Human Authentication*
Gaurav Jaswal (NIT Hamirpur India, India); Aditya Nigam (IIT Mandi, India); Amit Kaul and Ravinder Nath (NIT Hamirpur, India)
- 12:20 *Tensor Total Variation Regularized Moving Object Detection for Surveillance Videos*
Anju Jose Tom (NIT Calicut, India); Sudhish N George (National Institute of Technology, Calicut, India)
- 12:40 *Replay Attack Detection in Speaker Verification Using Non-Voiced Segments and Decision Level Feature Switching*
Malarvizhi Sundaresan Saranya (Indian Institute of Technology, Madras, India); Hema A Murthy (Indian Institute of Technology Madras, India); Padmanabhan Rajan (IIT Mandi, India)

WE08: Physical Layer Security

- 12:00 *Two Receiver Relay Broadcast Channel with Mutual Secrecy*
Krishnamoorthy Iyer (IIT Bombay, India)
- 12:20 *Practical Physical-Layer Group Secret-Key Generation in Three-User Wireless Networks*
J Harshan and Manish Rao (Indian Institute of Technology Delhi, India)
- 12:40 *Jammer Assisted SEE Maximization in Decode-and-Forward Relay Network*
Kirti Kant Sharma (IIT Delhi, India); Ranjan Bose (Indian Institute of Technology, India)

Wednesday, July 18, 13:00 – 14:00 Lunch

Wednesday, July 18, 14:00 - 15:15

WE09: Massive MIMO

- 14:00 *Uplink Training for Massive MIMO Systems Under Channel Aging*
Ribhu Chopra (Indian Institute of Technology Guwahati, India)
- 14:18 *Single-User mmWave Massive MIMO: SVD-based ADC Bit Allocation and Combiner Design*
Fnu I. Zakir Ahmed (University of California Santa Cruz, USA); Hamid Sadjadpour (University of California, Santa Cruz, USA); Shahram Yousefi (Queen's University, Canada)
- 14:37 *Kalman Filter Based Tracking for Channel Aging in Massive MIMO Systems*
Vikas Arya (Indian Institute of Technology BOMBAY, India); Kumar Appaiah (Indian Institute of Technology Bombay, India)
- 14:56 *Hybrid Block Diagonalization for Massive MIMO Two-Way Half-Duplex AF Hybrid Relay*
Arpita Chauhan (Indian Institute of Technology, India); Ekant Sharma (Indian Institute of Technology, Kanpur, India); Rohit Budhiraja (IIT Kanpur, India)

WE10: Audio and Speech Processing - 2

- 14:00 *Broad Phoneme Class Specific Deep Neural Network Based Speech Enhancement*
Pavan Karjol and Prasanta Kumar Ghosh (Indian Institute of Science, India)
- 14:18 *Radial Filter Design Using Kaiser Window Polynomials for Speech Source Separation*
Vishnuvardhan Varanasi and Ayushya Agarwal (IIT Kanpur, India); Rajesh M Hegde (Indian Institute of Technology Kanpur, India)

- 14:37 *Feature Extraction from Temporal Phase for Speaker Recognition*
Ami Gandhi (Infinium Solutionz Pvt. Ltd, India); Hemant A. Patil (Dhirubhai Ambani Institute of Information and Communication Technology, India)
- 14:56 *Model Order Estimation Using Ratio of Cumulative Sums of Eigenvalues*
Palakkal Vishnu (Indian Institute of Technology Madras, India); C S Ramalingam (IITM, India)

WE11: Machine Learning/AI for Signal Processing

- 14:00 *Recursive Network with Explicit Neighbor Connection for Image Captioning*
Mohammedsayeemuddin Shaikh and Manjunath V. Joshi (DA-IICT, India)
- 14:18 *Estimating Confidence for Deep Neural Networks Through Density Modeling*
Akshayvarun Subramanya , Suraj Srinivas and Venkatesh Babu Radhakrishnan (Indian Institute of Science, India)
- 14:37 *Decentralized Asynchronous Stochastic Gradient Descent: Convergence Rate Analysis*
Amrit Singh Bedi and Hrusikesh Pradhan (IIT Kanpur, India); Ketan Rajawat (Indian Institute of Technology Kanpur, India)
- 14:56 *Dynamic Network Latency Prediction with Adaptive Matrix Completion*
Ruchi Tripathi (IIT Kanpur, India); Ketan Rajawat (Indian Institute of Technology Kanpur, India)

WE12: Bio Signal Processing

- 14:00 *Compressed Sensing Recovery Using Modified Newton Gradient Pursuit Algorithm and Its Application to ECG with Denoising*
Anupama Arun (Indian Institute of Space Science and Technology, India); Sheeba Rani J (IIST Trivandrum, India); Thomas James Thomas (Indian Institute of Space Science and Technology, India)
- 14:18 *Suppression of Artifacts from Seismocardiogram Signal Using Two-Stage Kalman Filtering Model*
Tilendra Choudhary (Indian Institute of Technology Guwahati, India); L N Sharma and Manas Kamal Bhuyan (IIT Guwahati, India)
- 14:37 *Detection of Heart Sound Using Logistic Function Amplitude Moderator and Teager-Kaiser Energy Operator*
Alex Paul Kamson and L N Sharma (IIT Guwahati, India); Samarendra Dandapat (IITG, India)
- 14:56 *Discriminative Periodic Component Analysis for SSVEP Based BCI*
Kiran Kumar Guruswamy Ravindran (Indian Institute of Technology Madras, India); RamasubbaReddy Machireddy (IITM, India)

Wednesday, July 18, 15:15 – 15:45 Coffee Break

Wednesday, July 18, 15:45 - 17:30

SP.WE13: Speech Processing

- 15:45 *Automatically derived acoustic sub-word units: Some paradigms*
V. Ramasubramanian (IIIT Bangalore)
- 16:11 *Is there more to the spectrogram than meets the eye?*
Chandra Sekhar Seelamantula (IISc Bangalore)
- 16:37 *Variant and invariant characteristics in speech articulation.*

Prasanta Kumar Ghosh (IISc Bangalore)

17:03 *Unsupervised Representation Learning for Speech Signals.*

Sriram Ganapathy (IISc Bangalore)

SP.WE14: Full Duplex Communications

15:45 *Self-interference Modeling and Digital Cancellation Along with Full-Duplex Wireless System Analysis*

Dani Korpi , Taneli Riihonen , Lauri Anttila and Mikko Valkama (Tampere University of Technology, Finland)

16:11 *Self-Interference Cancellation via Beamforming in an Integrated Full Duplex Circulator-Receiver Phased Array*

Mahmood Baraani Dastjerdi , Tingjun Chen , Negar Reiskarimian , Gil Zussman and Harish Krishnaswamy (Columbia University, USA)

16:37 *Performance of LTE and 5G-NR cellular networks with full-duplex nodes*

Radhakrishna Ganti (IIT Madras)

17:03 *Full-Duplex Communication with Imperfect Self-Interference Cancellation*

Andreas Burg (École Polytechnique Fédérale de Lausanne)

SP.WE15: Security and privacy

15:45 *Backdoored Neural Networks (BadNets)*

Siddharth Garg (NYU)

16:11 *Software-defined security for next generation networks*

Vyas Sekar (Carnegie Mellon University)

16:37 *Signal Processing Problems in Cyber Physical System Security.*

Sandeep K. Shukla (IIT Kanpur)

17:03 *Data Privacy for a ρ -Recoverable Function*

Prakash Narayan (University of Maryland)

SP.WE16: Quantum information technology

15:45 *Quantum Communications: Concepts and Prospects*

Apoorva Patel (IISc Bangalore)

16:11 *Efficient measurement of high-dimensional quantum states*

Anand Kumar Jha (IIT Kanpur)

16:37 *Quantum Communication Using Coherent Rejection Sampling*

Rahul Jain (National University of Singapore)

17:03 *The theory and practice of quantum key distribution (QKD)*

Anil Prabhakar (IIT Madras)

Wednesday, July 18, 17:45 – 18:45 Social event [JN Tata Auditorium]

Wednesday, July 18, 19:00 – 21:00 Conference Dinner [Main Guest House Lawns]

Thursday, July 19

Thursday, July 19, 08:00 – 09:00 Registration for SPCOM 2018 at JN Tata Auditorum

Thursday, July 19, 09:00 - 10:15

TH01: Information Theory

- 9:00 *Degraded Relay Channel with Non-causal State Information at the Source and Relay*
Viswanathan Ramachandran (Indian Institute of Technology Bombay, India); Sibi Raj B Pillai (IIT Bombay, India); Vinod M Prabhakaran (Tata Institute of Fundamental Research, India)
- 9:20 *New Finite Blocklength Converses for Asymmetric Multiple Access Channels via Linear Programming*
Sharu Jose and Ankur A. Kulkarni (Indian Institute of Technology Bombay, India)
- 9:40 *A Lower Bound on Channel Capacity of a Nonlinear Fiber Optic Channel with Memory*
Konchady Gautam Shenoy (Indian Institute of Science (IISc), India); Vinod Sharma (Indian Institute of Science, India)

TH02: Topics in Signal Processing

- 9:00 *Analysis of Downsampling of DCT-Graphs*
Nileshkumar Vaishnav (Dhirubhai Ambani Institute Of Information And Technology, Gandhinagar, India); Aditya Tatu (DA-IICT, Gandhinagar, India)
- 9:18 *Improved Noncoherent Receiver for Joint Range and Symbol Estimation*
Sanjeev Sharma (Indian Institute of Technology, Indore, India); Abhijeet Bishnu (Indian Institute of Technology Indore, India); Anubha Gupta (Indraprastha Institute of Information Technology Delhi, India); Vimal Bhatia (Indian Institute of Technology Indore, India)
- 9:37 *Interference Localization On-Board the Satellite Using Drift Induced Virtual Array*
Aakash Arora (SnT, University of Luxembourg, Luxembourg); Sina Maleki (Ericsson, Luxembourg); Bhavani Shankar Mysore R (Interdisciplinary Centre for Security, Reliability and Trust & University of Luxembourg, Luxembourg); Joel Grotz (SES, Luxembourg); Björn Ottersten (University of Luxembourg, Luxembourg)
- 9:56 *Blind Equalization for Classification of Digital Modulations*
Gaurav Jyoti Phukan (IIT Guwahati & Bharat Electronics Ltd, India); Prabin Kumar Bora (Indian Institute of Technology, India)

TH03: Machine Learning/AI and Applications

- 9:00 *Distributed Learning Algorithm for Interference Avoidance in Coexisting WBANs*
Emy George (National Institute Of Technology, Calicut, India); Lillykutty Jacob (National Institute of Technology Calicut, India)
- 9:18 *Inference Algorithms for the Multiplicative Mixture Mallows Model*
Ranjitha Prasad (Tata Consultancy Services, India); Vincent Y. F. Tan (National University of Singapore, Singapore)
- 9:37 *On a Class of Restless Multi-armed Bandits with Deterministic Policies*
Prakirt Raj Jhunjhunwala (Indian Institute of Technology, Bombay, India); Sharayu Moharir (Indian Institute of Technology Bombay, India); D. Manjunath (IIT Bombay, India); Aditya Gopalan (Indian Institute of Science, India)

9:56 *Automatic Classification of Indian Languages into Tonal and Non-tonal Categories Using Cascade Convolutional Neural Network (CNN)-Long Short-Term Memory (LSTM) Recurrent Neural Networks*

Chuya China Bhanja and Dipjyoti Bisharad (National Institute of Technology Silchar, India);
Rabul Laskar (NIT SILCHAR, India)

TH04: Cooperative and Visible Light Communications

9:00 *Partial CSI Based Relay Selection for TWR-FSO over Unified Exponentiated Weibull Links*
Deepti Agarwal (IGDTUW, India)

9:18 *Estimate-and-Forward Relaying in Molecular Communication Using Brownian Motion with Drift*

Satish Kumar Tiwari and Prabhat Kumar Upadhyay (Indian Institute of Technology Indore, India)

9:37 *Spectral- And Energy-Efficiency for Massive MIMO Two-Way Full-Duplex Hybrid Processing AF Relay*

Ekant Sharma (Indian Institute of Technology, Kanpur, India); Rohit Budhiraja (IIT Kanpur, India); Ashish Kant Shukla (Indian Institute of Technology, India)

9:56 *On the Spatial Performance of Users in Indoor VLC Networks with Multiple Reflections*

Abhishek K Gupta (Indian Institute of Technology Kanpur, India); Adrish Banerjee (Indian Institute of Technology, Kanpur, India)

Thursday, July 19, 10:15 – 10:20 Break

Thursday, July 19, 10:20 – 11:20

10:20 Plenary Talk by Prof. Volkan Cevher : Trade-offs in resource constrained machine learning systems

Thursday, July 19, 11:20 – 11:45 Coffee Break

Thursday, July 19, 11:45 - 13:30

SP.TH05: 5G and next generation networking

11:45 *Fog and Software Defined Networking paradigms in 5th Generation Wireless Communication Networks*

Abhay Karandikar (IIT Kanpur)

12:11 *RF energy transfer channel models for sustainable IoT*

Swades De (IIT Delhi)

12:37 *5G New Radio-India's contribution to IMT-2020*

Kiran Kuchi (IIT Hyderabad)

13:03 *Towards low power terabit per second optical interconnects*

Shalabh Gupta (IIT Bombay)

SP.TH06: Mm-wave and THz systems

11:45 *Enabling the Third Wireless Revolution through Transformative RF/mmWave Circuits, Systems and Wireless Communication and Sensing Paradigms*

Harish Krishnaswamy (Columbia University, USA)

12:11 *Non-Destructive Testing using THz imaging*

Bala Pesala (Central Electrical and Electronics Engineering Research Institute)

12:37 *Periodic EM configurations and their applications for next generation Wireless systems.*

P.H. Rao (SAMEER - Centre for Electromagnetics, Chennai)

13:03 *Communication and Systems at Millimeter and Terahertz Waves*

Goutam Chattopadhyay (Jet Propulsion Laboratory, NASA, USA)

SP.TH07: Deep learning

11:45 *AMP-Inspired Deep Neural Networks, with Applications to Compressive Random Access and Massive-MIMO Channel Estimation*

Phil Schniter (The Ohio State University)

12:11 *Random Matrix Theory Application on Regularized Discriminant Analysis*

Tareq Al Naffouri (King Abdullah University of Science and Technology)

12:37 *Deep Learning Meets Sparse Coding*

Chandra Sekhar Seelamantula (IISc Bangalore)

13:03 *Hidden Talents of the Variational Autoencoder*

David Wipf (Microsoft Research Beijing)

Thursday, July 19, 13:30 – 14:30 Lunch

Thursday, July 19, 14:30 – 16:00 Graduation Day Event

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