SAMVAAD
NEWSLETTER
COMPENDIUM OF THE SAMVAAD-RESEARCH TALK SERIES AT IIIT BANGALORE
SEPTEMBER-DECEMBER 2018
VOL. 1, NO. 3

## A Note from Dean (R&D):

Welcome to the third edition of the Samvaad newsletter. This edition features 13 talks by Profs. Shivakumar Malapaka, Debabrata Das, Sachit Rao, Subir Roy, Srinath Srinivasa, Sujit Kumar Chakrabarti, T. K. Srikanth, Tricha Anjali, Uttam Kumar, V. N. Muralidhara, Ram Subramanian, V. Sridhar and Subhajit Sen. These talks span across the following research domains: Computer Science, Data Sciences, Electronics Systems Design, Information Technology and Society, Mathematics and Basic Sciences, Networking, Communication and Signal Processing and Software Engineering.

This edition of the newsletter features abstracts and links to all the 13 Samvaad talks that were presented during September 2018-December 2018.

The Research Samvaad initiative started in January 2018, continues to bring together researchers across domains in the institution, as well as from outside the institution. It is also gratifying to hear about new collaborations and joint project proposals coming out of the participation in Samvaad.

Samvaad features a public talk by one faculty member every week, introducing the ideas and questions that they are pursuing as part of their research.

Samvaad talks have already elicited interest from several quarters outside the institute. We hope to keep this momentum going and enable cross-fertilization of ideas and develop strategic research collaborations. We hope that you will find the talk details interesting, and our hope is that they will potentially

enable new path-breaking research directions as well as social impact.

## "Recent Developments in understanding Three Dimensional Turbulent Flows & Future Perspectives"

**by Prof. Shivakumar Malapaka on September 3, 2018**


**Abstract:**

In 3D-MHD flows, I try to define a property called magnetic helicity which is known to show both inverse and direct cascades. From the studies of this topic, we try to understand the cascade processes. The main result in this work has been a realization that the power law in the inertial range (where cascades take place) is different in different types of 3D-MHD turbulent flows, while the relation between several physical quantities may still be the same.

Research on understanding our improvement of the phenomenon of Intermittency is through 3D-HD flows that are Fractally decimated to create a turbulent flow of the desired fractal


**Speaker Bio:**

**Prof. Shivakumar Malapaka** did his M.Sc (Astronomy) from Osmania University, Hyderabad and M.Tech (Computational Techniques) from University of Hyderabad, Hyderabad. He worked for his Ph.D. in the Max-Planck Institute for Plasma Physics, Garching, Munich, and obtained the degree from the Department of Physics, Faculty of Physics, Mathematics and Informatics, University of Bayreuth, Bayreuth, Germany in 2009. His Postdoctoral experience includes working as a Research Associate in the Department of Aerospace Engineering, University of Colorado, Boulder, USA; CNRS – Independent Research Fellow at Laboratoire Jacques Louis Loins, UPMC, Paris, France; Research Fellow at Department of Applied Mathematics, University of Leeds, Leeds,

dimension. The important result from this study has been that intermittency vanishes as one moves from three-dimensional turbulence to a turbulent flow having a fractional dimension of 2.96 (theoretical). To substantiate this result, we present the analysis of the data obtained from our direct numerical simulations (DNS) in both spectral as well as spatial domains.

In this talk, I try to introduce what a turbulent flow is and dwell on two types of isotropic, homogeneous turbulent flows namely three dimensional hydrodynamic (3D-HD) turbulent flows and three dimensional magnetohydrodynamic (3D-MHD) turbulent flows. Using these two types of turbulent flows, two important topics of current research namely, intermittency and cascades will be presented. These results are a review of our work which contributed to the creation of a new paradigm in this area of work. The talk also presents our plans to improve this work further.

Spatial analysis of 3D-MHD flows which focus on understanding intermittency in those flows will also be presented. Our intentions to use topological analysis on DNS data for the first time in the world and the reasons behind it will be presented.

My interests (baby steps) in trying to understanding the monsoon modeling problem will be presented as an additional topic towards the end of the

UK; Visiting Postdoctoral Scientist at TIFR-TCIS – Visiting Scientist and ERC Postdoctoral Fellowship at Department of Physics, University of Rome 'TorVergata', Rome, Italy. He joined IIITB as an Assistant Professor, in July 2015, teaches Physics Theory and/or Lab for integrated M.Tech stream.

His scientific work mainly focuses on Numerical modeling and simulations of different problems in Physics. His research interests include direct Numerical Simulations of hydrodynamic and magnetohydrodynamic (MHD) turbulence using pseudospectral codes, statistical properties of the turbulent structures, Rotating turbulent flows, Astrophysical & Geophysical convection processes using Anelastic expansion and pseudospectral methods, Modeling and Simulations of MHD & MHD turbulence processes in Tokamaks (reduced resistive MHD approach using finite element method), Simulations of formation of Planets and Moons (involving N-body simulations) and Monsoon modeling.

**For videos:**

https://videoken.com/embed/2PtFo-I0bZA

talk, briefly.

## "Have I made a right choice by joining M.Tech/IMTech? What next? How to succeed and have a fulfilling technical career?"

**by Prof. Debabrata Das on September 10, 2018**


**Abstract:**

As a student many times it came to our mind, whether to join MTech/IMTech or only BTech or later on Ph.D. etc. At the young age when stepping into college, one may not have the necessary experience/maturity, even though the Internet is at our fingertips and we have relatives and friends around with different views! We only read a few success/failure stories in newspapers and magazines but a majority success/failure does not come to our notice! But it is clear over last one and half century majority of business driven by technologies (like a steam engine to Google, Electricity to life-saving machines, Uber, Ola, Online shopping, health, etc.). Hence, this talk has three parts: (Part-I) Have I done the right choice


**Speaker Bio:**

**Dr. Debabrata Das** is serving as Professor and Hewlett Packard Chair at IIITB. Before joining IIITB, he had served at G S Sanyal School of Telecommunication at IIT Kharagpur and later at Kirana Networks in New Jersey, USA. He is CoPI of a project from Ministry of Electronics and Information Technology, Government of India on Smart Home and another project on Single touch for citizen safety. He was PI of sponsored projects from Intel, Hewlett Packard, Microsoft, Motorola Research, Nokia, Cognizant Technology, Govt. of India on areas of IMS and Broadband Wireless MAC/QoS/Energy-saving, TVWS. His main areas of research interest are IoT and Wireless Access Network's MAC, QoS, Power saving. He has more than 115 peer-reviewed papers in

by joining MTech/IMTech (YES or NO); (Part-II) What next? (Part-III) How to achieve it? The speaker was Internship and Placement in charge of IIITB for 3+ years and later research/technical adviser to two top MNCs of the globe (in their respective technology business) and also in Govt. committees. The talk will share those experiences as it may be applicable to most of the companies and students. After the above discussion, the speaker requests the students to take their own decision according to their strengths and overcome the limitations (if required).

different Transaction/Journals and International Conferences. His more than 10 patents are under review. He and his wireless network team had contributed three ideas to IEEE 802.16m Broadband Wireless Standard. Dr. Das received his Ph.D. degree from the IIT Kharagpur.

Dr. Das has received Prof. K. Sreenivasan Memorial Award 2017 for excellent teaching in the areas of Telecommunication from IETE. Dr. Das has received Global IEEE MGA Achievement Award 2012. Outstanding Volunteer Award-2008 IEEE Bangalore Section. He is Fellow-IETE, Fellow-IE, and SM-IEEE. He was Chairman of IEEE Bangalore Section 2017. He is Chairman of IT-Service Management Forum India (itSMF); Board Member of IIIT-Bhubaneswar; Technical and Empower Committee member of e-Governance for Govt. of Karnataka.

**For Videos:**

https://videoken.com/embed/OdYGvL8TIOY

## "Building Autonomous Conversational Agents, Computer Vision Systems, Neural Networks, and Unmanned Aircraft that can fly Safely"

**by Prof. Sachit Rao on September 24, 2018**

**Abstract:**

In traditional control theory, an engineering system is made autonomous by providing it with an appropriate feedback control policy so that it can operate as it is meant to even in the presence of external disturbances. This talk will focus on how such principles can be applied, and its challenges, to non-traditional systems such as Conversational Agents (chatbots) and Computer Vision.

On the topic of chatbots, emphasis will be placed on the role played by context, as discussed in anthropological studies, in interactions with and between humans. The possible routes of research on how social learning theories can be used to model such an agent with continued interaction will be highlighted.

The use of appropriate statistical measures for image segmentation and classification and edge-aware smoothing in a conventional feedback mechanism forms the topic on Computer Vision. The potential of such a "control system" being able to

**Speakers' Bio:**

**Vaishnav Ram** is a MS by Research student, whose research interest is in the field of Image processing with a focus on early vision tasks such as low pass filtering and edge aware smoothing. He worked as a technical research associate in a startup, prior to joining IIITB. He is currently interning at Huawei R&D center, with the consumer cloud team. He has a Bachelor's in Engineering degree from VTU.

**Shreekantha Nadig** is currently pursuing MS by Research at IIITB. He is studying deep learning models and interpretability applied on Speech Recognition.
Before joining IIITB, he was a SVT engineer at Sonus Networks. He has a Bachelor's degree in Telecommunication Engineering from JNN College of Engineering, Shimoga, affiliated to VTU.

**Pradeep Kumar A V** joined the MS by Research program in 2016. His research interests are around image processing, machine learning and has prior publications in this domain. His current thesis is on

explain the basis of classification and parameter selection will be highlighted.

The component on Neural Networks will describe attempts to explain, using ellipsoidal domains, the need for a "deep" architecture and how its parameters can be initialized to reduce "learning'' time.

The final topic, that on Unmanned Aircraft, will concentrate on how trajectories, and feedback controllers, can be designed for such systems so that they can fly safely while operating in environments that can cause significant deviations.

using control theory principles in automating image thresholding. He holds a bachelor's degree in engineering from Anna University and is currently employed at Hewlett Packard Enterprise as a Specialist Engineer (R&D).

**Janaki Srinivasan** is an Assistant Professor at IIITB. Her research examines the political economy of information-based development initiatives. She uses ethnographic and archival research to examine how ideologically diverse entities deploy information and information technologies towards achieving their varied visions of development in India. Her recent projects have focused on identity systems, the role of intermediaries in cash-based economies, and learning in open information systems. She has a Ph.D. in Information Management and Systems from UC Berkeley and Masters degrees in Physics and in Information technology from IIT Delhi and IIITB.

**Sachit Rao** is an Assistant Professor at IIITB. His interests lie in the design and implementation of controllers for robotic manipulators and unmanned systems. He is also interested in using tools from Computer Science in widening the areas of applicability of automatic control. He obtained his Master's and Ph.D. degrees in Mechanical Engineering from the Ohio State University.

**For Videos:**

https://videoken.com/embed/UnSiIT6fvy4

**"Some emerging (and re-emerging) areas in digital VLSI Systems"**
**by Prof. Subir Roy on October 8, 2018**


**Abstract:**

The presentation will comprise three sub-topics:

1) Design of hard to detect hardware trojans in SOCs and FPGAs (Presenter – Subir K. Roy)

Malware such as hardware trojans in SOCs and FPGAs are a reality today. Securing SOCs and FPGAs against such malware, which is increasingly becoming more sophisticated, forces us to look at how to design them, so that we can find out methods to identify them during the verification and validation phases. We present the design of a small footprint hardware trojan embedded in an AES encryption block which can leak the encryption key and evade state of art Trojan detection approaches reported in the literature. Further, we present a signature-based detection scheme which can successfully identify this Trojan.

**Speakers' Bio:**

**Subir K. Roy** is a Professor at IIITB, with research interests in hardware formal verification, power estimation, performance analysis, embedded systems & testing and design for testability. He has been in IIITB since April 2013. Prior to this, he has worked in SCL, IIT Kanpur, Synplicity and Texas Instruments. He obtained his Ph.D. from IIT Bombay.

**Ms. Spoorthi MN** is a full-time MS by research scholar in Electronic Systems Design, IIITB. She joined the programme in August 2017. She is advised by Prof. Subir K. Roy.

**Ms. Manpreet Kaur Jaswal** is a full-time Ph.D. scholar in Electronic Systems Design, IIITB. She joined the programme in August 2016. She is advised jointly by Prof. Subir K. Roy and Prof. Subhajit

**For videos:**

https://videoken.com/embed/JEZnXtYSEeg

2) Design of high precision and high-speed Decimal Floating Point Units. (Presenter – Spoorthi M N)

Demand for faster, efficient and accurate floating-point computations is increasing in various applications, such as financial transactions, image, data processing & scientific computations, where decimal representations are more natural. Conversions from binary to decimal usually have rounding errors. Accumulation of small errors can be significant in the final result which is unacceptable – for example, correct rounding is a legal requirement in financial transactions. While decimal arithmetic has been around since the ENIAC days, some recent approaches have resulted in their re-emergence. We discuss some of them used in the implementation of two 32-digit decimal fixed-point multipliers towards realizing an IEEE 754-2008 compliant decimal floating point unit.

3) Design and analysis of an efficient FPGA-based profiling tool to aid hardware/software partitioning for reconfigurable embedded system applications. (Presenter – Manpreet Kaur Jaswal)

Modern embedded systems comprise of a programmable processor along with an application specific hardware to meet real-time design objectives. Profiling tools help in identifying critical code regions which consume a higher percentage of execution time on a processor. These can potentially be moved to dedicated hardware to achieve the overall speedup of

the application. To enable run time reconfigurability to meet real-time constraints we need to have on the fly profiling capabilities. We present some of our approaches to achieve this.

## "Understanding a post-web world"

**by Prof. Srinath Srinivasa on October 15, 2018**


**Abstract:**

One of the primary difference between this century and the previous one is the emergence of a global information network -- the World Wide Web. Nothing like the web has ever existed in human history. At no point in human history were we in a situation where for example, our thoughts, beliefs, and actions could be directly and continuously influenced by some factors from some other part of the world. There is no element of human activity that has not been affected in some form or the other by the world wide web. As we try to understand what exactly is the web, and what exactly is it doing to us, we often


**Speakers' Bio:**

**Srinath Srinivasa** heads the Web Science lab and is the Dean (R&D) at IIITB, India. Srinath holds a Ph.D. (magna cum laude) from the Berlin Brandenburg Graduate School for Distributed Information Systems (GkVI) Germany, an M.S. (by Research) from IIT-Madras and B.E. in Computer Science and Engineering from The National Institute of Engineering (NIE) Mysore. He works in the area of Web Science — that models the impact of the web on humanity. Technology for educational outreach and social empowerment has been a primary motivation driving his research. He has participated in several

face hermeneutic hurdles. We often approach the web as if it were a tool meant to extend human faculty, leading to grossly inaccurate models.

Our understanding of the web has slowly evolved over time. Today we no longer view the web as a tool or a machine meant to augment human faculties, but as an all-subsuming space in which humans participate. This talk introduces the audience to this change in perspective and the kind of implications that this shift in perspective, brings. The emerging field of Web Science is also introduced along with some of its conceptual underpinnings.

Finally, we will introduce some of the specific research challenges being addressed in the Web Science lab. Specifically, we will address the problem of modeling online social cognition, and web-enabled digital empowerment.

initiatives for technology-enhanced education including the VTU Edusat program, The National Programme for Technology Enhanced Learning (NPTEL) and an educational outreach program in collaboration with Upgrad. He is a member of various technical and organizational committees for international conferences like International Conference on Weblogs and Social Media (ICWSM), ACM Hypertext, COMAD/CoDS, ODBASE, etc. He is also a life member of the Computer Society of India (CSI). As part of academic community outreach, Srinath has served on the Board of Studies of Goa University and as a member of the Academic Council of the National Institute of Engineering, Mysore. He has served as a technical reviewer for various journals like the VLDB journal, IEEE Transactions on Knowledge and Data Engineering, and IEEE Transactions on Cloud Computing. He is also the recipient of various national and international grants for his research activities.

**Raksha P.S** is a Ph.D. Student at Web Science Lab. She has a Master's degree in Web Technology from PES Institute Of Technology, Bangalore and Bachelor's degree in Computer Science from K S Institute Of Technology, Bangalore. Prior to joining IIITB, she has worked as a Big Data Engineer at Cogknit Semantics Pvt Ltd, Bangalore. Previously she has worked on Ontology-Based Semantic Data Validation, Big Data, Data Visualization using D3.js, Web Crawlers, and Developing Learning Management System. Currently, she is working on characterizing online

social cognition as a marketplace of opinions.

**Chaitali Diwan** is a Ph.D. student at Web Science Lab, IIITB. She holds a MTech in Data Science from IIITB and B.E in Computer Science from VTU. Her research interests are web science, education technologies, NLP, multi-agent systems, semantic and web mining. She has around 10 years of software development experience and has worked in MNCs like Samsung India Research Centre, Qwest Telecom Software Services and Accenture Services. She has worked majorly on web technologies, data-centric applications, data workflows during her tenure in the software industry.

**For videos:**

https://videoken.com/embed/8vi1fM1EvzA

## "Algorithms in Software Engineering"

**by Prof. Sujit Kumar Chakrabarti on October 22, 2018**

**Abstract**:

In this talk, we discuss two projects

**Speakers' Bio:**

**Sujit Kumar Chakrabarti** has a Ph.D.

broadly in the area of automated software engineering.

The first project is in the area of requirement engineering. We present StaBL, a specification language inspired by the famous Statechart language, which we have developed and used for formal specification of web applications. We also present a formal verification approach to statically detect specification issues in StaBL specifications.

The second project is in the area of software testing. We present SymTest, a symbolic testing method for embedded systems. SymTest uses graph algorithms and symbolic execution to generate good test sequences for embedded systems.

Finally, we briefly discuss two projects, both intended to contribute to the society at large. In Refreshable Braille Reader project, we are working with our partners to provide engineering solutions that will provide the visually challenged increased access to digital content. We also discuss our experience in working with Anandawan in providing technological solutions for the working of a village of leprosy survivors and physically challenged.

from the Department of Computer Science and Automation, Indian Institute of Science, Bangalore. Prior to that, he has a masters from the University of Roorkee (now IIT Roorkee) in measurement and instrumentation, and a BE in electrical engineering from Nagpur University. His research interests are centered around software engineering, formal methods, computer languages, and software testing.

Sujit has nearly 8 years of experience in the industry, with companies like Tata Consultancy Services, Philips and General Motors both in research and software development. His research has touched a wide variety of domains like automotive, healthcare, web-services, compilers and process automation. Prior to joining IIITB, Sujit was with Jed-i, an educational startup involved in spreading the message of the joy in engineering.

**Karthika Venkatesan** is Senior Technical Officer at C-DAC Bangalore and has 8 years of R&D experience in the area of accessibility and e-Learning. She is currently pursuing her Ph.D. at IIITB in the area of requirements engineering and formal methods. She has completed her M.E in Software Engineering from College of Engineering-Guindy, Anna University, Chennai and B.E in Computer Science and Engineering from Anand Institute of Higher Technology, Chennai.

**Varsha Suresh** is currently a Ph.D. student at IIITB, pursuing her research in the area of formal specification and automated testing of embedded software.

Varsha has completed her M.Tech. in Computer Science and Systems Engineering in 2016, and B.Tech. in Computer Science and Engineering in 2014; both degrees from the Government Engineering College Idukki, Mahatma Gandhi University, Kerala. She is collaborating with ABB, Bangalore for her current research work.

**For videos:**

https://videoken.com/embed/-VPai27PHdY

## Talk by Prof. T. K. Srikanth on October 29, 2018

**Abstract:**

**Part 1: Healthcare**

We look at some of the work over the last few years as part of the E-Health Research Center at IIITB. We have been exploring the use of IT in improving the delivery of healthcare services, especially in the areas of mental health and disabilities, and with a focus on public health.

**Speakers' Bio:**

**Prof. Srikanth**'s current research focus are in the areas related to geometric modeling and graphics, internet applications, and data privacy, specifically in the context of their applicability to healthcare. He is a co-convenor of the E-Health Research Center and has multiple active

Geometric methods for brain tumor surgery: Removal of brain tumors is a critical, intricate and high-risk specialization of neurosurgeons, requiring a high level of skill, expertise and real-time decision making. We propose modeling the geometry of the tumor and surrounding brain regions, as well as the progression of surgery, to provide a better framework for surgery planning. Starting with imaging data (such as MRI), we extract geometric models and analyze these algorithmically to provide neurosurgeons with quantifiable options for decisions. This will be presented by Dr. Vikas V, Neurosurgeon, NIMHANS, and a Ph.D. scholar at IIITB, and is part of his larger research interest in robotic surgery.

We will then have a quick tour of projects at EHRC where IT has been used to conceptualize, develop, and deploy solutions in public health, patient outreach, and hospital automation.

**Part 2: Data privacy and Aadhaar:**

Aadhaar is now the world's largest biometric authentication system, and a core identification/authentication mechanism for many services in India. The implementation and use of Aadhaar have highlighted significant concerns about the privacy of information. In this talk, we will discuss the overall context of Aadhaar, the technology behind it, the potential privacy risks in the use of Aadhaar, and the social and legal concerns this raises. We will look at key portions of the Supreme Court's judgment on the legality and applicability of the scheme, and the implications of this for individuals and for organizations.

research collaborations with medical professionals and healthcare entities, many of which have resulted in solutions that have been deployed and are in active use. He earlier had an extended stint in the software industry, including at Sasken Communications, Bangalore and in a startup which he co-founded in the US, where he has worked in the areas of geometric modeling and mobile technologies.

He has a B.Tech (Mech) from IIT, Madras and a Ph.D. (CS) from Cornell University.

**Janaki Srinivasan** is an Assistant Professor at IIITB. Her research examines the political economy of information-based development initiatives. She uses ethnographic and archival research to examine how ideologically diverse entities deploy information and information technologies towards achieving their varied visions of development in India. Her recent projects have focused on identity systems, the role of intermediaries in cash-based economies, and learning in open information systems. She has a Ph.D. in Information Management and Systems from UC Berkeley and Masters degrees in Physics and in Information technology from IIT Delhi and IIITB.

**Dr. Vikas Vazhayil** is currently an Additional Professor of Neurosurgery at NIMHANS, and is pursuing Ph.D. at IIITB. He has completed his MBBS, MS in General Surgery, MCh in Neurosurgery, and DNB Neurosurgery. He has completed a fellowship in cerebrovascular surgery and

This session will be a discussion between Prof. Sridhar V, Prof. Janaki Srinivasan, and Prof. Srikanth.

had worked as a consultant at Sree Chitra Tirunal Institute of Medical Sciences and Technology during 2010-11. He has completed a decade long service at NIMHANS as a neurosurgeon. He has published several research papers pertaining to his work in neurosurgery. His current research interests, apart from core neurosurgery, include Surgical Robotics, AI, medical device design and development.

**For videos:**

https://videoken.com/embed/HEJbzxvSR4I

## "Evolution of Blockchain"

**by Prof. Tricha Anjali on November 5, 2018**

**Abstract:**

The talk would be broadly on the evolution of new technology – Blockchain. Even though it was introduced as the basis for Bitcoin, a popular cryptocurrency way back in 2009, today it has become a best-fit

**Speakers' Bio:**

**Tricha Anjali** is an Associate Professor at IIITB, with interests in computer networks and network security. She has been associated with IIITB since 2014.

solution for various domains from inventory tracking to IoT. The concept of Bitcoin has become very popular that most of the times, the terms blockchains and bitcoins are used interchangeably. So, in this talk, we would be explaining the fundamentals of blockchain and the different types of blockchain- Bitcoin, Hyper ledger etc. We will then explain the role of blockchain in IoT and the different research problems that people are currently working on. The talk would also touch upon the different consensus protocols used in the blockchain. Even though an extensive study was done in the field of consensus as part of distributed systems, the existing mechanisms need to be tailored to fit the blockchain network. We will also look into another variant of Blockchain i.e Permissioned Blockchain. We will go through a brief overview of existing Permissioned Blockchain like Quorum and Corda and a detailed security overview (Membership and access control, Privacy of data and participants) of Hyperledger Fabric. The Fabric Identity Mixer will be discussed further.

Prior to this, she worked at IIT Mandi and Illinois Institute of Technology Chicago. She obtained her Ph.D. at Georgia Institute of Technology, Atlanta.

**Ms. Anjana Prabhakar** is a research scholar pursuing Ph.D., under Prof. Tricha Anjali at IIITB. Her broad area of research is IoT Security. She is currently exploring the role of blockchain in IoT access control.

**Ms. Priti Kumari** is a Ph.D. student working under Dr. Tricha Anjali. Her broad area of research is Network Security. Currently, she is looking into Cryptographic Key Management Protocols.

**For videos:**

https://videoken.com/embed/MPumdQcuXNc

## "Subpixel Learning Algorithms for Estimating Global Land Cover Fractions from Satellite Data Using High-Performance Computing" by Prof. Uttam Kumar on November 12, 2018


**Abstract:**

The physical surface of the landscape is undergoing transformation either naturally or due to human interference, giving rise to Land Cover Land Use Change (LCLUC). Expanding urban regions and consequent LCLUC have emerged as one of the major anthropogenic sources of global environmental degradation, bringing numerous stresses to landscapes, vegetation, natural habitats, soil, air, water, etc. LCLUC at a sub-continent to global level can be monitored through high temporal and low spatial resolution data, such as those obtained from Landsat at 30 m or MODIS Terra/Aqua at 250 m spatial resolution. These satellites improve the ability to map large areas of Earth's surface quickly and inexpensively due to their wider IFOV. However, different land cover (LC) types jointly occupy a single pixel, and the resulting spectral measurement is a composite of the individual spectra. The intrinsic scale of spatial variation in LC is usually finer than the scale of sampling imposed by the image pixels. Due to scale-

**Speaker Bio**:

**Dr. Uttam Kumar** is an Assistant Professor and Infosys Foundation Career Development Chair Professor at IIITB. He holds a Bachelor's Degree in Computer Science from VTU Belgaum, Diploma in Advanced Computing from CDAC Pune, Master's Degree in Geoinformation Science from the University of Twente, The Netherlands and Ph.D. in Algorithms for Geospatial Data Analysis from IISc, Bangalore.

He has published 30 research papers in national/international journals, 6 book chapters, 49 papers in conference proceedings and 8 technical reports. He has delivered 60 invited guest lectures and is the reviewer of 25 national and international scientific journals. He has received several awards including The Institute of Engineers India (IEI) Young Engineers Award 2016; NASA Group Achievement Award by NASA, Washington, D.C.; Certified Sentinel of Science Award 2016 in the Earth and Planetary Sciences;

resolution mismatch, the spatial resolution of the details on the ground is less than what is required, leading to sub-pixel heterogeneity, imposing limitations in ecological modeling with these data sets. The talk will present some attempts to resolve the mixed pixel problem.

5 Best Paper Awards and the Young Geo-Spatial Scientist Award 2011, New Delhi.

**For videos:**

https://videoken.com/embed/-iSldyJnMs8

## "Online algorithm to minimize total flow-time"

**by Prof. Muralidhara on November 19, 2018**

**Abstract:**

This talk is on online algorithms, with the main focus on two problems, paging and job scheduling on unrelated machines to minimize total flow-time. The first part of the talk will be on paging. We will define the competitive ratio of an online algorithm and show that LRU is a k competitive and show that any deterministic algorithm has a competitive ratio of at least k. Then we shall introduce the notion of resource augmentation and show that LRU is 2 competitive if it is given double the size of the cache

**Speaker Bio:**

**Dr. Muralidhara VN** is an Associate Professor at IIITB. He is with the Institute from August 2009. He has obtained Ph.D. in Computer Science and Engineering at Indian Institute of Technology Delhi. His thesis was in the area of Algorithms. He is interested in the theory of algorithms and complexity, and it's applications. More specifically, his broad area of research interests includes combinatoric optimization, approximation algorithms, randomized algorithms, and on-line

compared to an offline algorithm. In the second part of the talk will be on scheduling jobs to minimize the total flow-time. Will show that SRPT is optimum on a single machine and show that there does not exist an on-line algorithm with a bounded competitive ratio for the unrelated scheduling problem. Then will discuss the 1+ε speed O(1/ε^2) competitive algorithm for minimizing the total weighted flow-time for the unrelated scheduling problem.

algorithms.

**For videos:**

https://videoken.com/embed/TRIUGxfKNB4

## "Some paradigms in automatic speech recognition"
## by Prof. RamSubramanian on November 26, 2018


**Abstract:**

This talk will focus on automatic speech recognition (ASR), highlighting some of the recent/ongoing work we are pursuing. Specifically the talk will dwell on 7 major directions of research constituting current Masters and Doctoral students' work: i) multi-lingual ASR using predicted articulatory features, ii) semi-supervised (or self-training) and active-learning

**Speaker Bio:**

**Ramasubramanian** obtained his B.S. degree from the University of Madras in 1981, B.E. degree from Indian Institute of Science, Bangalore in 1984 and the Ph.D. degree from Tata Institute of Fundamental Research (TIFR), Bombay in 1992. He has been engaged in research in speech processing and related areas for nearly 3 decades. Prior to the present position, he

scenarios for acoustic model refinement, iii) attention based models for ASR, iv) 0-speech (zero-speech) paradigms, v) acoustic sub-word unit based ASR, vi) co-articulation modeling for ASR and vii) associative memory formulations based on Hopfield and Boltzmann networks. Most of these paradigms are defined/re-defined within current machine-learning / deep-learning frameworks, combining the complementary strengths of conventional speech-specific knowledge and intensive data-driven machine-learning trends - a kind of amalgamation repeatedly emphasized as the optimal approach for developing machine-recognition of speech, capable of integrating and nearing human-speech recognition performances, but which has usually lead to divisive research positionings in every cycle of new and emerging paradigms.

was Professor at PES Institute of Technology, South Campus, Bangalore, 2013-2017. He has worked in various institutions and universities, such as TIFR, Bombay (1984-99) as Research Scholar, Fellow and Reader; University of Valencia, Spain as Visiting Scientist (1991-92); Advanced Telecommunications Research (ATR) Laboratories, Kyoto, Japan as Invited Researcher (1996-97); Indian Institute of Science (IISc), Bangalore as Research Associate (2000-04) and Siemens Corporate Research & Technology (2005-13) as Senior Member Technical Staff and as Head of the speech research group "Professional Speech Processing – India" (2006-09). He has over 65 research publications in these areas in peer-reviewed international journals and conferences. He is also the author of a Springer monograph on "Ultra low bit-rate speech coding", Springer NY, 2015.

**For videos:**

https://videoken.com/embed/PGnZwoqbR00

**Talk by Prof. V. Sridhar on December 3, 2018**


**Abstract:**

The talk is divided into three parts, and the following will be presented in these parts:

1. A cross-national study using a panel data set and empirical analysis of the impact of digital infrastructure and digital flows on the economic development of nations;

2. Modeling and analysis of broadband penetration across regions of China and India;

3. Analysis of allocation and pricing of radio spectrum for commercial mobile services in India

The other related areas of work including Net Neutrality detection mechanisms, regulating Unsolicited Commercial Communication, adoption and penetration of public Wi-Fi will be briefly discussed.

A sneak preview of the forthcoming book "Emerging ICT Policies and Regulations: Roadmap to Digital Economies" will also be given.

**Speaker Bio:**

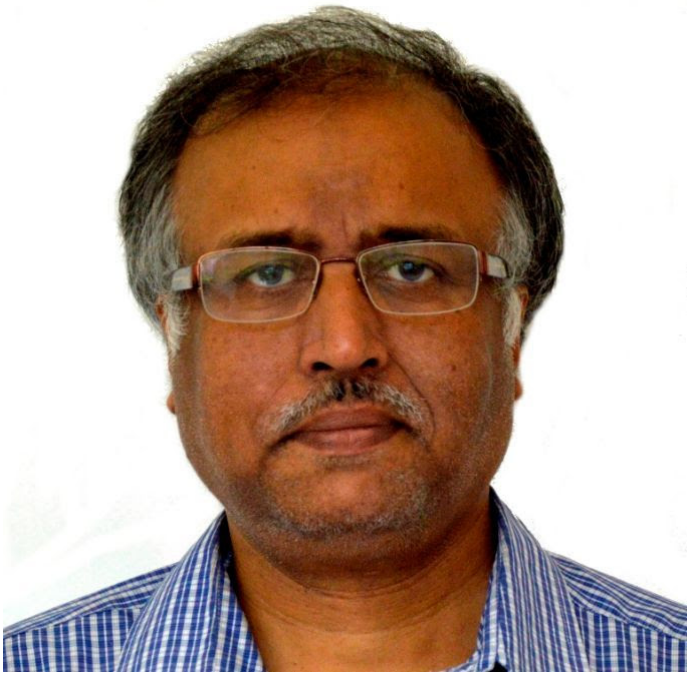
**Dr. V. Sridhar** is Professor at the Centre for IT and Public Policy at the International Institute of Information Technology Bangalore (IIITB), India. He has published many articles in peer-reviewed leading telecom and information systems journals. He is the author of two books published by the Oxford University Press: The Telecom Revolution in India: Technology, Regulation, and Policy (2012), and The Dynamics of Spectrum Management: Legacy, Technology, and Economics (2014). He is authoring his third book titled Emerging ICT Policies and Regulation: Roadmap to Digital Economies in contract with Springer Nature publications. Dr. Sridhar has taught at many Institutions in the USA, Finland, New Zealand, and India. He was also a visiting scholar at Aalto University, Finland and was the recipient of the Nokia Visiting Fellowship. Prior to joining IIITB Dr. Sridhar was a Research Fellow at Sasken Technologies, India. He has been a member of Government of India

committees on Telecom and IT. He has written more than 250 articles in prominent business newspapers and magazines relating to telecom regulation and policy in India. Dr. Sridhar is very active in organizing and chairing conferences on telecom regulation and policy and has received funding from different sources for his research projects.

Dr. Sridhar has a Ph.D. from the University of Iowa, U.S.A., Masters' in Industrial Engineering from the National Institute for Training in Industrial Engineering, Mumbai, India, and B.E. from the University of Madras, India. His work can be accessed at http://www.vsridhar.info

**For videos:**
https://videoken.com/embed/GN1mvTTX-CM

## "Real-time Image Guided surgery using Ultrasound"
**by Prof. Subhajit Sen on December 10, 2018**



**Abstract:**

**Speakers' Bio:**

The talk will be on an ultrasound-based imaging tool and a surgical method that will help surgeons accurately locate and pin-point selected regions in human tissues during insertion of a surgical object such as cannula or catheter. One application of the tool is to treat physiological conditions in the brain known as Hydrocephalus that results from excessive accumulation of Cerebrospinal fluid (CSF) in the brain thereby resulting in dangerously excessive pressure. The accurate pointing of the catheter into the ventricle region of the brain facilitates CSF removal and helps to drastically improve the chances of success during surgery (currently at 30%).

The talk begins with an introduction to physics and technology of diagnostic ultrasound including an explanation of the construction and operation of the ultrasound transducer. The signal conditioning and processing concepts involved in ultrasound imaging are then explained. We explain the need for an AFE (analog front-end) and FPGA (Field-programmable-gate-array) processing for the high-throughput data involved. We illustrate the application of the tool for the VP shunt procedure by building an A-mode imager using a single 5 MHz transducer and a realistic model of the brain and explain how the tool will be applied during surgery. We also explain our future plan to build a multi-element imaging array using "electronic" beam-steering or "beamforming" and some results using an open-source FIELD-II ultrasound simulation software tool.

**Prof. Subhajit Sen** passed with B.Tech in Electronics Engineering from Institute of Technology, Banaras Hindu University, Varanasi, India in 1984, M.S. from Louisiana State University, U.S.A. in 1991 and with Ph.D. in Electrical & Computer Engineering from University of Waterloo, Ontario, Canada in 1997. His Ph.D. thesis was in the area of design of Analog-Digital converters for wireless communications. Between 1984 to 1988 he worked at Semiconductor Complex Ltd., Chandigarh, India. Subsequent to his Ph.D. studies and till 2009 he has worked in the Indian semiconductor industry for about 10 years. He has two U.S. patents in the areas of trans-impedance amplifier(TIA) and PLL charge-pump. He worked at Dhirubhai Ambani Institute of Information & Communication Technology(DA-IICT), Gandhinagar as Associate Professor from April 2009 – May 2013. His general interests are in analog, mixed-signal & RF VLSI integrated circuit & system design, digitally-assisted analog circuit design, embedded-systems for bio-medical applications.

**Aheesh K N** passed with B.E in Bio-Medical Engineering from Manipal Institute of Technology, Manipal University. He is currently pursuing M.S. by research at IIITB in the area of ultrasound imaging. His general interests are in embedded-systems for Bio-Medical applications and High speed embedded hardware design particularly using FPGAs.

## For videos:

This project is being carried out under EHRC with the active collaboration of NIMHANS.

https://videoken.com/embed/bJBYFbUAmtc