

ABOUT IEEE COMSoc CHAPTER BANGALORE NEWSLETTER

The IEEE ComSoc Chapter Bangalore Newsletter includes news useful to its members, non-member and highlights most important technology development. It also highlights important concluded and upcoming events. Links for few important topics from current issue of *IEEE Communication Magazine* are also

EDITOR MESSAGE

Dear readers,

Welcome 2020! With joy and happiness.

I am delighted to present the 6th edition of ComSoc newsletter, Bangalore Chapter December 2019 issue. I would like to thank the chair and Ex-Com for giving me this opportunity in bringing the sixth issue of the newsletter. The newsletter highlights the activities achievements carried out in the past six months. We have included the articles of current trends and nontechnical article in communication community and job opportunity, higher education information in both national and international. We will be happy are to receive for more articles from various streams in the field of communication, technical research, social awareness to be published in coming next issues.

Suggestions are welcomed.

Triveni.C.L

Newsletter Editor, IEEE ComSoc Bangalore Chapter
trivenicl@ieee.org

CHAIRMAN-2020 MESSAGE

Dear IEEE members,



We welcome you all to a grand new year! And a decade full of ambition, hope and grit! I am certain that, as valued member of IEEE, you have been benefiting significantly through continuous learning and professional network.

IEEE Bangalore chapter and our Communications society has been quite vibrant with your active participation. We appreciate a good number of you contributing in technical forums, in-depth workshops, student contests and other initiatives.

Let us also acknowledge all the time and effort put by Chairs, Execom and Volunteers. Their drives have brought numerous laurels and recognition to our society thus far.

It is my pleasure, as Y2020 Chair, to invite your fresh thinking on what our society should further embark upon, what we must sustain well and what already has served its purpose. We are planning a Summer School on '5G and IoT' in June 2020 with ~100 students. We are privileged to have IEEE 5G World Forum hosted in Bangalore in Sept 2020. We will continue our advanced workshops and deep-tech sessions in 5G, Blockchain, Intelligent Transportation Systems and other cutting-edge technologies.

Our society has good representation from Industry and Academia. We would like to find avenues to leverage this mix judiciously and in a more meaningful way. Wherever it makes sense, we would like to work collaboratively with other organizations and associations so that you could receive further stimuli for your professional growth.

Seasons' Greetings to you and your family!

I am looking forward to your engaged participation in Y2020!

Dr. Alok Nath De,

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CHAIRMAN MESSAGE

It has been a great year during 2019 for the IEEE Communications Society Bangalore Chapter.

At the outset, I would like to thank and congratulate all the volunteers and executive committee members for their outstanding contributions this year, which has led to our Chapter receiving the Chapter Achievement Award for 2019 for the Asia Pacific Region from the IEEE Communications Society. It is a wonderful recognition and we should all be very proud of the accomplishment.



We have continued with really good work during the second half of the year. We hosted the 2nd and 3rd 5G summits for the year at Nokia on August 17th and at Samsung on Nov 30th respectively. Both events were very well attended. Also, as planned, we had fun study group meetings at the Jio Avana office with interesting discussions related to Massive MIMO and Quantum Communications led respectively by our passionate teachers, Dr Ganesan Thiagarajan and Anand Mohandas.

IEEE ComSoc chapter members participated actively in the organizing committee and also gave invited talks and participated in panels at the [IEEE International Conference on Advanced Networks and Telecommunication](#)

[Systems \(ANTS\)](#) in the BITS Pilani Goa campus in December. Flt Lt A T Kishore organized a couple of workshops related to Drones in the city in September & October as part of his new educational initiative called Vidhya Sangha Technologies. Subhas Mondal organized the 2nd edition of the ITS workshop at Wipro in November with a focus on addressing traffic problems in smart cities such as Bangalore. Prof Navin Kumar organized a nice Distinguished Lecture related to Satellite Antennas by Dr. Sudhakar Rao followed by a discussion related to the Fellow Nomination process at the Jio office this December. In Jan 2020, Dr Soma Pandey will be co-chairing a Women-in-Engineering Forum event at COMSNETS in Bangalore.

I am happy to announce that the IEEE Future Networks Initiative has decided to host the IEEE 5G World Forum in Bangalore between September 10-12, 2020 at the Leela Palace in Bangalore. This will be a mega event of sorts for our IEEE Communications Society members, and it would be an honor for us to host it next year. A sincere thanks to Dr Ashutosh Dutta from Johns Hopkins University who was very helpful in bringing this international event to Bangalore. Besides, the IEEE Communications Society has also approved funding for a weeklong summer school to be held at the IIIT Bangalore between June 20-24th, 2020. We hope to host 80 to 100 students during the summer school, and we hope to have a series of lectures by distinguished speakers from academia and industry, related to the latest research and developments in 5G and future networks and emerging technologies to educate the students. Also, we plan to have industry visits along with birds-of-a-feather sessions for like-minded student researchers to gather together and collaborate during the summer school.

All in all, it has been very nice teamwork and great cooperation and coordination amongst all the chapter members. This year has also seen a remarkable increase in the chapter membership which now stands at around 375 active members with an increase of over 100 members since the past year. We also hope that additional student members can join the society as well in the coming future with the new \$1 membership fee for students that the IEEE Communications Society has instituted. We therefore also hope that those additional student chapters could form in our community.

I now hand off the chair role to Dr Aloknath De for 2020. Helping him will be Dr Ganesan Thiagarajan as Chair-Elect, Dr. Manoj Chowdhury as Vice-Chair, Sagar Basavaraju as Secretary, Mahesh Jha as Treasurer, Subhas Mondal as Industry Chair, Anand as Industry Co-chair, Prof Navin as Past Chair Emeritus, along with many of the rest of us also continuing to help. Let us wish the new team the very best. We plan to recognize a lot of our outstanding volunteers at the AGM on Jan 5th.

A continued sincere thanks to all the volunteers who have contributed articles and to companies who have kindly offered to sponsor this newsletter and a very special thanks to Ms. Triveni for her continued support and outstanding help in the collation of content to create this edition of the newsletter. We have completed the second year of this newsletter now, and collectively we hope to continue the tradition to publish the newsletter along with our humble volunteering contributions to the community in the coming years.

Sincerely,

Dilip Krishnaswamy

IEEE ComSoc Bangalore Chapter Chair

NEW CHAPTERS BY COMSoc

IEEE ComSoc is inaugurated in CMRIT Bangalore on 30th April 2019. The lighting of the lamp was done by the principal, Dr. T Srinivas, Mr. Anand M, Mr. Mahesh Kumar Jha, and Miss. Rashmi. Mr. Anand on behalf of the Communication society engaged our crowd in an interesting talk on Quantum communication.



IEEE communications society student branch chapter has been initiated at Malnad college of engineering, Hassan was held on 3rd October 2019 at ECE Seminar hall from 10.am to 1.00 pm. The event was successfully organized under the guidance of Prof. Triveni.C.L. The IEEE MCE students were aware of the IEEE benefits during this event. The IEEE MCE Branch students have actively participated and conducted the event successfully.



Dear Reader, we plan to dedicate this page for 5G Tutorial Series. Starting from the basic, I would like to continue discussing about 5G Cellular System and Technologies in sequence (starting from Part 1, Part 2, etc). The tutorial will be in continuation from the previous issue. I hope, we will go in parallel with ongoing 5G research and development. It is believed that the reader will gain better understanding of 5G Cellular System if they follow the tutorial. In this Part V we have discussed on Cloud RAN architecture, advantages but in this issue the SDN and NFV architecture is included as well as future challenges in 5G.

Navin Kumar, PhD, Associate Professor, Amrita School of Engineering Bangalore

5G TECHNOLOGY AND CELLULAR SYSTEM TUTORIAL SERIES: PART VI – ENABLING TECHNOLOGIES

Sheeba Kumari M, PhD Scholar
Navin Kumar, PhD

In this part of the series, we focus on the advanced network architectures envisioned to accomplish the 5G goal. There is a pertinent need to introduce flexibility in network architecture that can be met using two programmable design technologies namely, software defined networking (SDN) and network function virtualization (NFV).

SDN provides an intelligent architecture for network programmability that reduces the hardware constraints. The idea is to separate the control and forwarding planes of the network to allow external control of data through a logical software entity called a controller. The controller, sit between network devices and applications, will manage packet-flow control to enable intelligent networking. This way the controller is part of the control plane and the data plane is composed of network devices that forward packets. The SDN architecture is depicted in Fig.1. As seen, the control plane includes both northbound and southbound interfaces. The former provides a network abstraction to network applications while the latter standardizes the information exchange between the control and data planes. The programmability of 5G SDN networks allows the administrators to easily manage the network and introduce new applications and services. The decoupling of network control and data planes is also seen to be beneficial for effective radio resource allocation through centralization and seamless mobility across different technologies through a common control plane.

Another key technology that has the potential to impact future 5G networking by refactoring the architecture of traditional networks is NFV. The aim of NFV is to virtualize a set of network functions by putting them into software packages. This enables the consolidation of many heterogeneous network devices. NFV can be used to virtualize the core network and to centralize the base band processing within radio access networks (RAN). Accordingly, NFV provides services which were conventionally run on proprietary hardware with virtual machines that may be understood as an operating system imitating dedicated hardware. With NFV, functions such as routing, load balancing and firewalls can be easily delivered by virtual machines

Both SDN and NFV are key enablers of the 5G infrastructure to enable the orchestration and control of the technological resources in the RAN, transport and cloud network in a flexible, scalable, agile, and efficient way. They help to realize the network slicing concept.

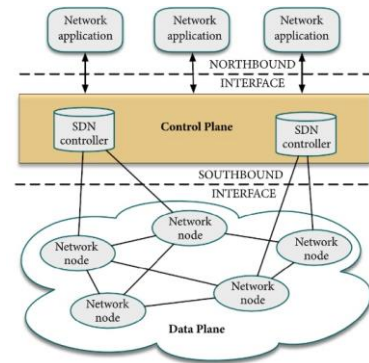


Fig. 1: SDN architecture

Source: <https://doi.org/10.1155/2018/6923867>

Network slicing intends to create and partition different services on a network, thereby enabling operators to provide optimum support for these services.

In the 5G context, a network slice is generally defined as an end-to-end logically isolated network that includes 5G devices along with access, transport, and core network functions. The usage of physical network resources can be optimized by sharing the network functions between different slices. Finally, we provide the major research challenges in 5G orchestration and control as reported in the literature in Fig. 2.

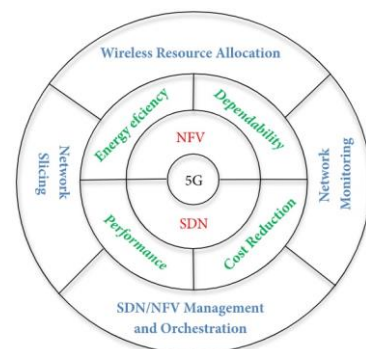


Fig. 2: Possible future research challenges

Source: <https://doi.org/10.1155/2018/6923867>

The use of SDN and NFV to decouple software from hardware and manage network behaviour from a control plane will aid 5G networks to deliver diverse services to different customers. However, dealing with different network slices that should provide services with differing requirements in terms of latency, reliability, capacity, and functionality would be a major challenge. In addition, immense research is required in obtaining guaranteed QoS, efficient resource utilization and proper isolation between slices.

IMPORTANT LINKS<http://www.comsoc.org/><http://www.comsoc.org/free-tutorials><http://www.comsoc.org/whitepapers><http://www.comsoc.org/training/training-calendar/road-5g><http://www.comsoc.org/tech-focus><http://www.comsoc.org/ctn/death-and-possible-rebirth-dsp><http://www.comsoc.org/comstandardsmag>http://www.ieee.org/about/volunteers/volunteer_index.html?WT.mc_id=dhtml_vol_see**EXTELLIGENCE IN THE CONTEXT OF
HYPERCONNECTIVITY IN THE INTERNET OF THINGS
(IoT)***Nishant Krishna -**<https://www.linkedin.com/in/nishantkrishna/>*

Article repurposed from the originally published article from LinkedIn at

<https://www.linkedin.com/pulse/extelligence-context-hyperconnectivity-internet-things-krishna/>

“As the Internet of things advances, the very notion of a clear dividing line between reality and virtual reality becomes blurred, sometimes in creative ways.” - Geoff Mulgan

Tapping the omnipresent intelligence

As a technologist and a geek, I like the time I live in. Consider the following facts:

1. I can learn any new technology within weeks or even days without the need of attending a physical classroom-based course.
2. The entire sum of knowledge is available for me at my fingertips.
3. I can contribute to the vision of the world of tomorrow much effectively, than what I could have done 10 years back.
4. My quality of work is not necessarily defined by where I'm at this point in time.

In a nutshell, the human is becoming omniscient and omnipotent if you consider “knowledge is power”, and access to it readily is even more powerful.

You'd ask me, why I am bringing this up? Who even cares to introspect into this newly found power? This type of access to knowledge has become a norm, so why even bother understanding how is this created or how we consume it?

There is only one reason - This knowledge is external to us. We haven't created it as an individual and we don't have this entire sum total of knowledge stored in our brains.

Actually, there is another reason. As humans, we are not strong enough to rely on ourselves to take care of all the adverse conditions. We always need to fall back on others for their intelligence and knowledge.

This is a good time to transition into setting the stage clear for creating an analogy for the IoT devices which can be compared to humans. IoT devices are highly constrained. They can't do everything by themselves. They can't protect themselves from attacks. They can't always perform functions like encryption and anything similar which is processing and memory intensive. They literally have to use External Intelligence to take care of their basic needs.

Enter the powerful world of Extelligence

Extelligence is a term coined by Ian Stewart and Jack Cohen in their 1997 book *Figments of Reality*. They define it as the cultural capital that is available to us in the form of external media. They contrast extelligence with intelligence, or the knowledge and cognitive processes within the brain.

Although Cohen's and Stewart's respective disciplines are biology and mathematics, their description of the complicity of intelligence and extelligence is in the tradition of Jean Piaget, Belinda Dewar, and David A. Kolb. Philosophers, notably Popper, have also considered the relation between subjective knowledge (which he calls world 2), objective knowledge (world 1) and the knowledge represented by man-made artifacts (world 3). [Wikipedia article on Extelligence]

Other terms which are closely related to Extelligence are - External Intelligence, Hive Mind, Group Intelligence, Collective Knowledge, and so on.

The Waggle Dance

Bees are very intelligent creatures. They work tirelessly towards finding the source of nectar and then converting it to honey. They at the same time take care of 100s of housekeeping activities in the beehive.

One question always puzzled a lot of scientists - When few bees find a source of nectar, how do they tell this back to the rest of the swarm.

The answer lies in the Waggle Dance - the name refers to the dance-like movement of honeybees after their return to the hive. This is the direction the bee moves in relation to the hive indicates direction; if it moves vertically the direction to the source is directly towards the Sun. The duration of the waggle part of the dance signifies the distance.

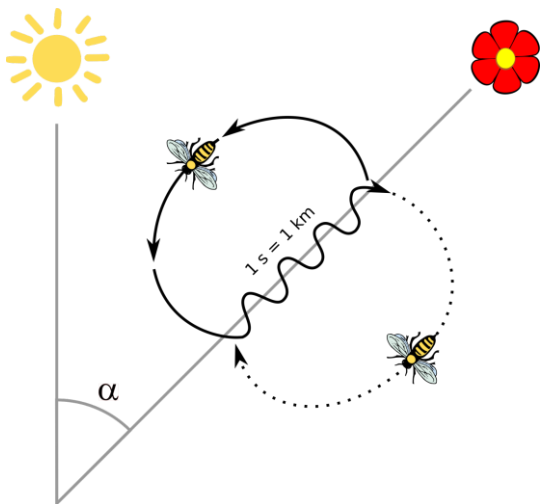


Figure: Diagrammatic representation of the Waggle Dance
| Image Credits: Wikipedia

Bees are also known to be using the sun's position as a navigation tool to guide them to their hive. We can say they have Trigonometry embedded in their DNA.

These are few of the ways nature has blessed the bees with extraordinary ability to use the collective knowledge of the swarm. In this mode of working as a team, Communication and External Knowledge play a major role, and can many times help them survive.

At the pinnacle of Extelligence, bees demonstrate, the entire hive work as a single organism. Moreover, it seems to have a mind of its own, and hence the term "Hive Mind".

Blurring Boundaries in the Hyperconnected World

Hyperconnectivity is a term invented by Canadian social scientists Anabel Quan-Haase and Barry Wellman, arising from their studies of person-to-person and person-to-machine communication in networked organizations and networked societies. The term refers to the use of multiple means of communication, such as email, instant messaging, telephone, face-to-face contact, and Web 2.0 information services. [Wikipedia article on Hyperconnectivity]

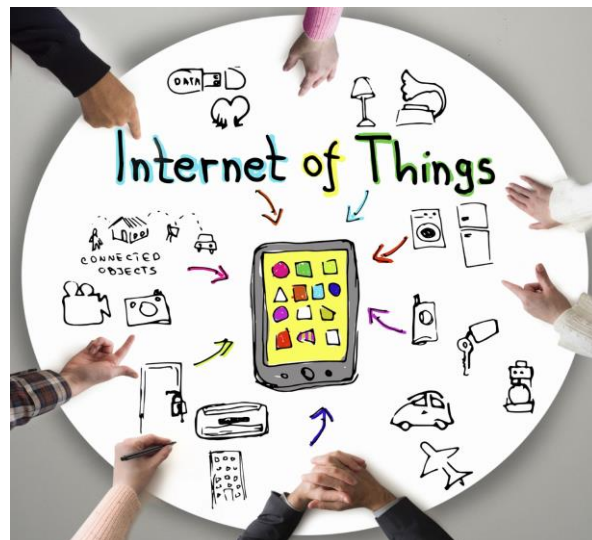


Figure: Internet of Things (IoT) devices have become pervasive | Image Credits: IEEE (The Democratization of Innovation for the Internet of Things)

We were already using all these means of connecting with each other and with machines, we rely on. Now that wasn't enough, the Internet of Things (IoT) came in the picture. IoT devices are becoming part of our lives to such extent that we can't ignore them.

Bringing Extelligence into IoT Devices using ROOF (Realtime Onsite Operations Facilitation)

ROOF is an IEEE Standard in progress and is being worked on under IEEE P1931.1.

ROOF is a federated networking and computational paradigm for the Internet of Things (IoT) that is always available for Realtime Onsite Operations Facilitation (ROOF).

COMSoc T-TIME CHARCHA

A unique and innovative idea Tea/Coffee - Technology Innovation, Management and Entrepreneurship Charcha (event) is conceived. A FREE half day event to discuss on the above topics by Experts. Host organization, preferably from Industry if willing to host, kindly contact us.

Dr Navin Kumar, navinkumar@ieee.org

Mr Anand. M (anand.m@ieee.org)

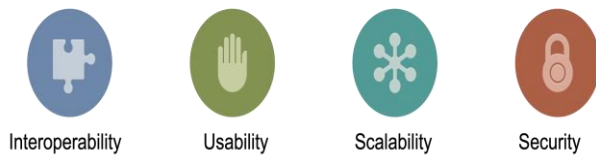


Figure: ROOF solves the main problems in today's IoT deployments.

ROOF can help in designing realtime, scalable, secure and innovate IoT applications by augmenting the power of IoT devices. This is done by creating a framework for external intelligence and knowledge which IoT devices can use.

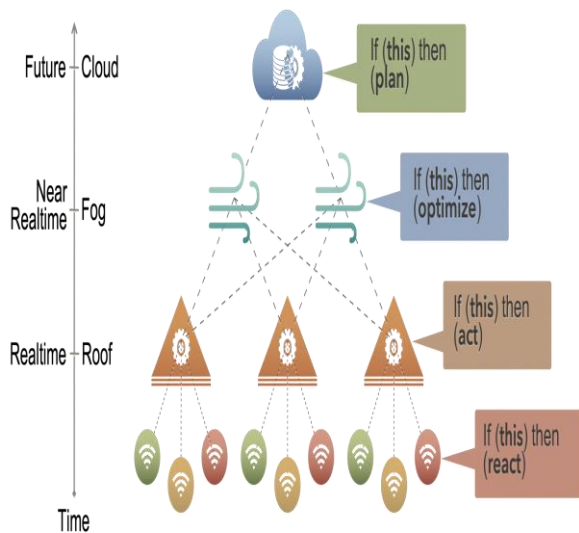


Figure: ROOF uses the higher layer to impart the indispensable and new features to IoT devices, including Spatiotemporal Event Handling.

Conclusion

Extelligence or External Intelligence is a powerful form of knowledge or intelligence. This “sum of human intelligence” or “collective knowledge” is the currency for success for today's citizens in the hyperconnected world. The principle of Extelligence applies to the constrained IoT devices as well. IoT devices, when they get help in terms of external intelligence and knowledge, tend to outperform their tasks.

ROOF can make the IoT devices and their use cases much more powerful by adding the Extelligence factor.

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JOB/RESEARCH

Internship and Job - UG/PG

@ Amrita, ECE Dept. (B Tech ECE, 01); M Tech (CSE or ECE -01) for one year as Research Asst. (navinkumar@ieee.org)

@ ThingTronics, B Tech (>65%), (ECE/CSE -04); MBA -02, contact - rk.arvapally@thingtronics.com.

@ Terminus Circuits, M Tech VLSI (03); (gsjaved@ieee.org)

@WoW Studio, Acct Manager 02[contact (lopa@worldofwowstudio.com)

PhD Studentship Abroad

1. PhD position at Queen Mary University of London on ML/IoT, interested candidates can apply using the following link.
<https://www.findaphd.com/phds/project/phd-studentship-in-machine-learning-and-iot/?p113421>
2. KTH Royal Institute of Technology, School of Electrical Engineering and Computer Science, seeks PhD students in "Machine Learning over Networks"
<https://www.kth.se/en/om/work-at-kth/lediga-jobb/what/job/jobID:305925/where:4/>
3. PhD position with full scholarship is open to Students Worldwide (Overseas). It is funded by Northumbria University in the area of Malicious Cyber Attacks and Defence Mechanisms in Smart Grids. More information:
<https://www.findaphd.com/phds/project/malicious-cyber-attacks-and-defence-mechanisms-in-smart-grids-advert-reference-rdf20-ee-mpee-jiang/?p116786>
4. Multiple fully funded Ph.D. positions are available in the Wireless Communications and Information Processing (WiCom) group within the Mike Wiegers Department of Electrical and Computer Engineering (ECE) (<http://www.ece.k-state.edu/wicom>) at Kansas State University (KSU) starting in Fall 2020. We are seeking applicants with strong mathematical/statistical foundations who have experience in 5G/6G wireless communications, stochastic modelling, analysis and optimization. A background in both foundations and applications of artificial intelligence/machine learning to wireless networks is a plus but not required.

JOBS

The Department of Information and Computer Science at King Fahd University of Petroleum and Minerals, Saudi Arabia, invites applications for Cybersecurity Chair Professor. Details can be found in the attached document and at the following link

<https://imsva91-ctp.trendmicro.com/wis/clicktime/v1/query?url=http%3a%2f%2fwww.kfupm.edu.sa%2fdepartments%2fics%2fSitePages%2fen%2fNewsDisplayForm.aspx%3fCUSTOMID%3d23&umid=0E9F18C9-9A0D-2205-9BF1-E93F28CF7301&auth=ec34f7633709e8bd85e48c7fc0c92c09c079e558-3a44640d11641ff48131a6338adc016c480d15f8>

All in Three: How to Pitch Your PhD in 180 Seconds

http://blogs.nature.com/naturejobs/2017/04/24/all-in-three-how-to-pitch-your-phd-in-180-seconds/?WT.mc_id=EMX_NJOBS_0427_NATUREJOBSNEWSLETTER_A&WT.ec_id=EXTERNAL

READER'S CHOICE (VOTE & WIN)

Vote for the best article and win surprise prize. Please follow the link to vote:
https://docs.google.com/forms/d/1RRKwAynzq2dzS5P6rC_Src7t6Ab8f9P8xADI5P2NeBs/edit
 The winner will be announced in the next issue.

CALL FOR CONTRIBUTION TO COMSoc NEWS

Please get in touch with us if you wish to write and to be included in this newsletter (in the area of Communication Technology). The article should be from 300-1000 words in docx or doc file and separate image jpeg or tiff file format. You can submit to: (trivenicl@ieee.org and navinkumar@ieee.org)

IF YOU WISH TO ADVERTISE

Please contact us to advertise in the newsletter. Newsletter is electronically circulated to more than 6000 members among IEEE communities. Increase your visibility with us.

Navin Kumar (navinkumar@ieee.org)
 or Anand M (anand.m@ieee.org) and
 Ms Triveni CL (trivenicl@ieee.org)

CALL for HOSTING an EVENT

Are you interested in hosting an Event (workshop, guest lecture, special technical, research program) by Us? Get in touch. We will try our best to meet your request.

An article on mental health of PhD students

<https://www.nature.com/articles/d41586-019-03489-1?sap-outbound-id=7AED89D8743AEDF6A073AC819310505A008552BD&mkt-key=005056B0331B1EE782DDEAF9F48AD1EA>

IMPORTANT EVENTS (JUNE 2019 – DECEMBER 2019):

EVENT NAME	DATE AND MONTH	VENUE
5G SUMMIT 2 – 5G AND FUTURE NETWORKS	17 AUGUST 2019	VENUE – NOKIA NETWORKS, L-5 BUILDING, MANYATA TECH PARK, BANGALORE
RESEARCH METHODOLOGY WORKSHOP	13-14 SEP 2019	CHRIST UNIVERSITY, LAVASA, PUNE
T-TIME CHARCHA	26 OCT 2019	RELIANCE JIO OFFICE, BANGALORE
COMSoc STUDY GROUP SESSION	9 NOV 2019	RELIANCE JIO, AVANA BUILDING, SARJAPUR JN, OUTER RING ROAD
5G SUMMIT 3 – 5G IOT AND ANALYTICS	30 NOV 2019	SAMSUNG R & D INSTITUTE, BANGALORE
DISTINGUISH LECTURE: DR. SUDHAKAR RAO, IEEE LIFE FELLOW, TECHNICAL FELLOW,	12 DEC 2019,	RELIANCE JIO OFFICE, AVANA BUILDING, SARJAPUR JN, OUTER RING ROAD, BANGALORE

STUDENT BRANCH CHAPTER INFORMATION

AMRITA SCHOOL OF ENGINEERING, BANGALORE CAMPUS

ASE ComSoc Student Branch Chapter is formed in April 2016. The student branch has largest number of student members over 120 and perhaps the largest Student ComSoc Members. They conduct lot many activities and are very active.



<https://ieee-amrita.firebaseio.com/>



Demystifying 5G and IoT - Seminar



INDIAN INSTITUTE OF SCIENCE

Faculty Advisor – Prof T Srinivas, ECE Dept

JOINT CHAPTER INAUGURATED

- **CMRIT BANGALORE**

Branch Counselor – Prof Mahesh K Jha

- **MALNAD COLLEGE OF ENGG,
HASSAN**

MCE ComSoc Student Branch Chapter is formed in Oct 2019 with the following details.

Faculty advisor: Triveni.C.L

Student Chair: Shravan.N, Secretary: Gokul Gowda

RVCE STUDENT BRANCH CHAPTER

RVCE ComSoc Student Branch Chapter is formed in the month of July 2016 with faculty advisor as Dr S Ravishankar, Professor in the Dept. of ECE.

Faculty Coordinator: K S Shushrutha Asst.

Professor, Dept. of ECE, RVCE

Student Chair: Prakhar Jain, Student, Dept. of ECE, RVCE

THANK YOU NOTE FOR THE CONTRIBUTORS

We would like to thank every author who showed interest and submitted their works. We could not include all of them mainly because of scope and relevance.

START COMSOC STUDENT BRANCH CHAPTER IN YOUR ORGANIZATION/INSTITUTION

If you would like to start ComSoc Student Branch Chapter, please get in touch with us (Chair/Secretary). We will help you to establish.

IEEE COMMUNICATIONS MAGAZINE

November 2019, Vol. 57, No. 11

Special Issue Telecommunication and Network Engineering Education

Also in This Issue
Data Science and Artificial Intelligence



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Brigade Gateway, Dr Rajkumar Road,
Malleswaram, Bangalore, Karnataka 560055

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Navin Kumar (navinkumar@ieee.org)

or Anand M (anand.m@ieee.org)