WAVES

Bharti Foundation

THE BHARTI SCHOOL NEWSLETTER

"To Develop Telecom Leaders Through Excellence in Education and Research"

Issue 9 **October 2020**

Bharti School in Action: Activities

- *TSDSI Workshop*
- *Open Technology Festival*
- *Publications*
- *Lectures/ Talk*
- *New Faculty Members*

Honour And Awards

- *Bharti Merit Award & Best Women Graduate Award 2018-19*

Student Activities

- *Placements*
- *Student's views*
- *Students who attended International Conferences & Presented Papers*
- *Students who attended National Conferences/ Workshops & Presented Papers*

Bharti Foundation

- *Views from Bharti Foundation*





Greetings !

Current year of Bharti School has been quite eventful, with different levels of unforeseen challenges and some meaningful progress. The school continues to be in prominence thanks to the associated faculty members' and students' top-level research outcomes. With an eye on remaining at the forefront of cutting-edge and cross-disciplinary research, a few labs have been restructured and new labs and central research facilities have been created. Further, aiming at facilitating research translation, to build closer ties industrial R&D, and to promote industry-academia collaborative product development and research, a space has been earmarked for setting up a continuously-upgradable open communication system test-bench. This additional industry-oriented central research facility is planned to be professionally managed by research engineers with the support from industry collaborators. Fund raising efforts are ongoing to build the basic facility. This infrastructure is expected to aid the various cross-disciplinary research involving all the departments encompassing Electrical Sciences

The MTech curriculum has been revamped with the inputs from the industry, towards making the program more hands-on and industry relevant. New specialization streams on Artificial Intelligence & Machine Learning and Cyber Security have been introduced. To promote more industry interactions, industry-oriented student research projects and industry internships are being encouraged.

Bharti School wings have expanded with the joining and association of several new faculty members. For increased industry collaborations industry leaders and experts have been newly appointed as Adjunct Faculty and Adjunct Professor-of-Practice. Efforts are ongoing to recruit more and more qualified research stuff to support industry-relevant research activities of the School.

The students have continued to do well this year also in terms of placements – as evident from healthy placement figures.

With sustained efforts, support, and well wishes, let us hope to take the school to a greater height.

Best regards,
Swades De, PhD
Professor and Head

ACTIVITIES:

❖ Workshop on "Machine Learning in Future Networks and Role of Standardisation"

One-day workshop on "Machine Learning in Future Networks and Role of Standardisation" was organised by Telecommunications Standards Development Society, India (TSDSI) and Bharti School of Telecommunication Technology & Management, IIT Delhi with support from India EU Cooperation on ICT Related Standardization, Policy and Legislation Project on 29th November, 2019 at Bharti School, IIT Delhi.

This workshop was organized by Bharti School, IIT Delhi in collaboration with TSDSI for deliberating on the aspects of Machine Learning in Communication, and ongoing Standardization activities. Objective of the workshop was to discuss about the future of ML in communication, and its implications. The workshop intended to throw light on the ongoing development activities of ML in communication field, along with a projection of its scope. Applications of ML in communications, challenges & benefits along with debate on standardization formulations, with a focus on India specific requirements was the primary focus of the workshop. It was conducted in the form of context setting and experience sharing by representative utilities on the topics, expert talk/s and panel discussions to identify actionable items for taking forward. The workshop had experts from academia as well as Industry, providing cues on how to navigate the standards development process in order to reach their standardization objectives.











❖ Open Techology Festival

Fifth-generation (5G) technology has the potential to bring a massive range of evolutionary innovative applications, which will not only help countries but will also aid societies around the world.

Open Technology Foundation and Fiware Foundation, Berlin, EU in collaboration with Bharti School of Telecommunications of Indian Institute of Technology Delhi (IIT Delhi), Foundation for Innovation and Technology Transfer (FITT) IIT Delhi and Ministry of Electronics & Information Technology (MeitY) Government of India, organized a four-day Open Technology Festival, which commenced on 4 December 2019. This four-day festival was organized to showcase how 5G advance wireless technology could revolutionize our world. The four-day open technology festival was a grand success where many key points were highlighted and discussed by the eminent speakers, related to innovations in smart city, education, and the health care systems Globally and in India.

The first day of the festival was focused on Smart City technologies. A very informative keynote address was presented by Mr. Stefano de Panfilis, FIWARE Foundation where he gave a detailed introduction about the FIWARE platform.

Second day of the fest focussed on emerging technologies and innovation in education where many distinguished professors, school students, and student counselors participated and discussed the current education system in India

The third and fourth day of the open technology festival was highlighted on emerging technology and innovations in healthcare respectively. Many medical practitioners shared their views on these topics.













PUBLICATIONS

❖ Publication since 24th SAB

- Nilay Pandey, Sandeep Joshi, Ranjan K Mallik, Brejesh Lall, “Channel Characterization for Devices in a Turbulent Diffusive Environment: A Mobile Molecular Communication Approach”; IEEE Transactions on Molecular, Biological and Multi-Scale Communications, vol 5, December 2019.
- Suraj Suman, Sidharth Kumar and Swades De, “Impact of Hovering Inaccuracy on UAV-aided RFET”; IEEE Communications Letters, Vol. 23, December 2019.
- V. Gupta, S. De, "Adaptive multi-sensing in EH-WSN for smart environment," in Proc. IEEE GLOBECOM, Waikoloa, HI, Dec. 2019.
- Suraj Suman, Sidharth Kumar and Swades De, “UAV-assisted RFET: A novel framework for sustainable WSN”; IEEE Transactions on Green Communication Network, Vol. 3, December 2019.
- P. Mukherjee, D. Mishra, and S. De, "Gaussian Mixture based Context-aware Short-Term Characterization of Wireless Channel," IEEE Transactions on Vehicular Technology, vol. 69, no. 1, pp. 26-40, Jan. 2020.
- W. A. Khan, P. Das, S. Ghosh, M. Roy Chowdhury, S. Tripathi, S. Kaur, S.Chatterjee, and S. De, "Smart IoT Communication: Circuits and Systems," Research exhibit, in Proc. COMSNETS, pp. 1-2, Bangalore, India, Jan. 2020. (The runner-up research demo award)
- S. Suman and S. De, "Performance analysis of UAV-aided RF energy transfer," Poster paper, in Proc. COMSNETS, pp. 1-3, Bangalore, India, Jan. 2020.
- S. Tripathi, M. Roy Chowdhury, and S. De, "Versatile multivariate data pruning in smart grid IoT networks," Poster paper, in Proc. COMSNETS, pp. 1-3, Bangalore, India, Jan. 2020. (Best poster paper award first runner-up)
- A Ghosh, R Berry, “Entry and Investment in CBRS Shared Spectrum”; 18th International Symposium on Modeling and Optimization in Mobile, AdHoc, and Wireless Networks (WiOPT); June 2020.
- Arnob Ghosh, Vaneet Aggarwal, “Penalty Based Control Mechanism for Strategic Prosumers in a Distribution Network”; *Energies* 2020, Vol. *13*(2), pages 452, January 2020.
- Garima Mishra, Subrat Kar, S.Dharmaraja, “Signaling Packet Aggregation and Compression in SIP Network: Modeling and Performance Evaluation”; Wireless Personal Communications, Volume 110, Pages 651-676, 2020
- J. Goel and J. Harshan, "On the Optimal ARQ Distribution for Low-Latency Communication over Line-of-Sight Dominated Multi-Hop Networks," 2020, 18th International Symposium on Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks (WiOPT), Volos, Greece, 2020, pp. 1-8.
- A. K. Shukla and M. R. Bhatnagar, "Differential Modulation for Buffer-Aided Cooperative Relaying with Priority-Based Max Link Selection", in Proc. Veh. Tech. Conf., Antwerp, Belgium, 2020, pp. 1-6.
- A. K. Shukla, B. R. Manoj, and M. R. Bhatnagar, "Virtual Full-Duplex Relaying in a Buffer-Aided Multi-Hop Cooperative Network" in Proc. Int. Conf. on Sign. Proces. and Comm., Bengaluru, India, 2020, pp 1-5.
- S. Sriraam, S. Sajeev, R. Joshi, A. Vithalkar, M. Bansal and H. Jagadeesh, "Implementation of 5G Authentication and Key Agreement Protocol on Xbee Networks," 2020 International Conference on COMmunication Systems & NETworkS (COMSNETS), Bengaluru, India, 2020, pp. 696-698, 2020.
- S. Anchal, B. Mukhopadhyay and S. Kar, "Person Identification and Imposter Detection using Footstep generated Seismic Signals," in IEEE Transactions on Instrumentation and Measurement, 2020.
- M. N. Pachery and M. Bhatnagar, "Double Differential Modulation for LEO-Based Land Mobile Satellite Communication," in IEEE Transactions on Aerospace and Electronic Systems, vol. 56, no. 4, pp. 3339-3346, Aug. 2020.
- A. Grover, B. Lall, “A Novel Method For Removing Baseline Drifts in Multivariate Chemical Sensor”, IEEE Transactions on Instrumentation and Measurement, 2020.
- A. Grover, B. Lall, “A Data-Driven Framework For Deploying Sensors In Environment Sensing Application”, IEEE Transactions on Industrial Informatics, 2020.

- N. Gautam and B. Lall, “Blind channel coding identification of convolutional encoder and reed-solomon encoder using neural networks,” in 2020 National Conference on Communications (NCC), (IEEE, 2020), pp. 1–6.
- Manishikha Rawat, Brejesh Lall, and Seshan Srirangarajan, “Analysis of Underwater Acoustic Channel based on Angle of Arrival Distribution”, 12th International Conference on Communication Systems & Networks (COMSNETS), 7-11 January 2020, Banglore.
- M. Roy Chowdhury, S. Tripathi, and S. De, "Adaptive multivariate data compression in smart metering Internet of Things," IEEE Trans. Ind. Informat., (accepted, Mar. 2020).
- V. Gupta, S. Tripathi, and S. De, "Green Sensing and communication: A step towards sustainable IoT systems," (Invited article), J. Indian Inst. Sc., pp. 383-398, Apr. 2020.
- P. Mukherjee and S. De, "A system state aware switched-multichannel protocol for energy harvesting CRNs," IEEE Trans. Cognitive Commun. Netw., vol. 6, no. 2, pp. 669-682, Jun. 2020.
- V. Gupta and S. De, "Collaborative multi-sensing in energy harvesting wireless sensor networks," IEEE Trans. Signal Inf. Process. Netw., vol. 6, no. 1, pp. 426-441, 2020.
- S. Suman and S. De, "Low Complexity Dimensioning of Sustainable Solar-enabled Systems: A Case of Base Station," IEEE Transactions on Sustainable Computing, vol. 5, no. 3, pp. 438-454, Jul. 2020.
- S. Tripathi and S. De, "Channel-adaptive transmission protocols for smart grid IoT communication," IEEE Internet of Things J., vol. 7, no. 8, pp. 7823-7835, Aug. 2020.
- A. Thakur, S. De, and G.-M. Muntean, "Co-channel secondary deployment over DTV bands using reconfigurable radios," IEEE Trans. Veh. Technol., (accepted, Aug. 2020).
- P. Das, S. Ghosh, S. Chatterjee, and S. De, "Energy harvesting-enabled 5G advanced air pollution monitoring device," in Proc. IEEE 5F World Forum, pp. 1-5, Bangalore, India, Sep. 2020.
- S. Suman and S. De, "Optimal UAV-aided RFET system design in presence of hovering inaccuracy," IEEE Trans. Commun., (accepted, Sep. 2020).
- N. Varshney and S. De, "Optimum downlink beamwidth estimation in mmWave communications," IEEE Trans. Commun., (accepted, Sep. 2020).
- S. Kumar, S. Suman, and S. De, "Dynamic resource allocation in UAV-enabled mmWave communication networks," IEEE Internet of Things J., (accepted, Sep. 2020).
- Ugrasen Singh and Manav R. Bhatnagar, “Secrecy performance analysis of adaptive SSK Transmission”, 31st Annual Intrenational Symposium on Personal, Indoor and Mobile Radio Communication, 2020, pages 1-7.
- A. Batta, M. Gandhi, A. Kar, N. Loganayagam, V. Ilavarasan, "Diffusion of blockchain in logistics and transportation industry: An analysis through the synthesis of academic and trade literature" in Journal of Science and Technology Policy Management. (Final revision submitted, DOI is expected in October)

LECTURES/ TALK

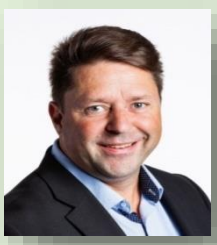
❖ Bharti Lectures

12th December, 2019

“Key Drivers & Research Challenges for 6G”

By

Prof. Matti Latva- aho,
Director for 6G Flagship,
University of Oulu, Finland



❖ Talk

03rd February, 2020
"Communication Technologies and Requirements for Industry 4.0"
By
Prof. Arumugam Nallanathan, Queen Mary Univ. London, UK



05th February, 2020
"Smart Sampling: Super-Resolution and Learning Strategies"
By
Dr. Satish Mulleti, Postdoctoral Fellow at the Weizmann Institute of Science, Israel



10th February, 2020
"Microgrid Control"
By
Prof. Sukumar Mishra, Departmnet of Electrical Engineering, IIT Delhi



25th May, 2020
"On the Asymptotics of Some Large-Scale Networks"
By
Dr. Arpan Mukhopadhyay, Assistant Professor, Department of Computer Science, University of Warwick



02nd July, 2020
"Coded Computing for Large-scale Distributed Data Analytics"
By
Mr. Saurav Prakash, University of Southern California (USC), Los Angeles



24th September, 2020
"Enriching Engineering Education through Experiential, Collaborative and Social Learning"
By
Prof. P.V. Madhusudhan Rao, Department of Mechanical Engineering, IIT Delhi



NEW FACULTY MEMBERS



Prof. Sukumar Mishra
Specialities:

- Power System Engineering, Intelligent Techniques for Contorl of Power System and Power Quality Studies, Renewable Energy



Prof. Smruti Ranjan Sarangi
Specialities:

- Computer Architecture, Operating Systems



Prof. Amol Choudhary
Specialities:

- Photonics, Integrated Optics, Microwave Photonics, Optical Communications, Nonlinear Optics, On-chip Lasers, Frequency Combs, Ultrafast Lasers, Photon-phonon Interactions



Prof. Arpan Chattopadhyay
Specialities:

• Wireless Networks, cyber-physical systems: design, control, learning, security and performance optimization, Statistical signal processing



Prof. Shouri Chatterjee
Specialities:

•Analog Circuit Design and VLSI, Analog and Digital Filter Design, Low Power and Low Voltage Circuit Techniques, Measurement and Instrumentation techniques



Prof. Arnob Ghosh
Specialities:

•Game Theory, Stochastic Optimization, Resource Allocation, Smart Grid, Multi-agent learning, Mechanism Design, Transportation Network.



Prof. Kolin Paul
Specialities:

•Reconfigurable Computing, Embedded Systems



Prof. Sandeep Kumar
Specialities:
Applications of optimization theory, Signal processing, Machine learning and graph methods in data analytics, communication and networks



Prof. Vireshwar Kumar

Specialities:

•Security and Privacy in Cyber-Physical Systems, Applied Cryptography, Adversarial Machine Learning



Dr. Dilip Krishnaswamy (Adjunct Faculty)
Specialities:

•5G Networks, Edge Services, Network Slicing, Distributed Analytics and Optimization, Blockchain Technology and Quantum Computing



Mr. Krishna Sirohi (Adjunct Professor-of- Practice)
Specialities:

•Wireless Technology (4G-LTE/5G Access & Network), Millimeter Wave Technology based product for strategic communication and commercial network applications, Network Security and IOT based systems and solution.

HONOURS AND AWARDS

BHARTI MERIT AWARD AND BEST WOMEN GRADUATE AWARD (2018-19)

BHARTI SCHOOL OF TELECOMMUNICATION TECHNOLOGY AND MANAGEMENT
INDIAN INSTITUTE OF TECHNOLGY DELHI

BHARTI MERIT AWARD 2018-19

CONGRATULATIONS!!!

M.Tech (Telecom Technology Management)

1st Position	2nd Position	2nd Position	3rd Position
			
Kartik Gupta (2018JTM2250)	Anshuman Singh (2018JTM2004)	Pardhi Chandan Waman (2018JTM2248)	Shivam Gupta (2018JTM2774)

M.B.A (Telecom System Management)

1st Position	2nd Position	3rd Position
		
Vibhishek Chandar K (2018SMT6631)	Aastha Gupta (2018SMT6630)	Gokulkrishnan S (2018SMT6597)

Best Women Graduate Award

M.Tech ((Telecom Technology Management) and M.B.A (Telecom System Management)



Aastha Gupta
(2018SMT6630)

STUDENT ACTIVITIES

❖ Placement:

M.Tech and MBA graduates had an excellent placement

Companies who recruited M.Tech Students:

Intel Technoogies India Pvt. Ltd., Samsung Semiconductor India R&D Center, Max Linear, Mavenir Systems Pvt. Ltd., Reliance Jio Infocomm Ltd., AMD

Highest Salary Offered: Rs. 23.75 Lac P.A.

Average Salary Package: Rs. 19 Lac P.A.

Companies who recruited M.Tech Students:

Wipro, Axtria, Rockwell, HashdIn

Highest Salary Offered : Rs. 22 Lac P.A.

Average Salary Package: Rs. 19.18 Lac P.A.

❖ Bharti Students Views:



Anshuman Singh
2018JTM2134

My Bharti journey has been nothing sort of phenomenal. The flexibility to take up streamed electives in Signal & Information Processing, Communication Systems, Telecom Management & Analytics, Embedded Systems and Computer Networks combined with 24*7 accessible state-of-art labs helped me discover my interest areas and deep-dive into them. I am more industry ready due to some very good laboratory courses. At the end I feel confident of tackling any engineering problem thrown at me on my own with right set of resources.



Kartik Gupta
2018JTM2133

My Bharti journey has been really interesting. The flexible curriculum and the laboratory courses have altogether helped me to develop a dynamic approach towards solving problems and learning new stuff in a given timeline. Yes, there was hard work required and deadline pressure, but the efforts never go in vain, and yes, they bore results. This journey has made me more confident and more ready for the industry.



Alok Sinha
2015BSZ8100

I am a part of the Bharti family since July 2015. My journey has been very exciting here. The 24*7 lab access facility of Bharti School makes things easier for researchers. Apart from research, I also learned a great deal about life and professionalism.

❖ Students who attended International Conferences and Presented Papers :



Ashish Kant Shukla attended conference “Vechicular Technology Conference Spring 2020” held at Antwerp, Belgium from 25-28 May 2020.

He got his paper published “Differential Modulation for Buffer-Aided Cooperative Relaying with Priority-Based Max Link Selection”.



Jaya Goel attended conference “The 18th International Symposium on Modeling and in Mobile, AdHoc and Wireless Networks (WiOpt 2020)” held at Greece”.

She got her paper published “On the Optimal ARQ Distribution for Low-Latency Communication over Line-of-Sight Dominated Multi-Hop Networks”.



Ugrasen Singh attended conference “31st Annual International Symposium on Personal, Indoor Mobile Radio Communication” held at London, United Kingdom from 31 August – 3 September 2020.

He got his paper published “Secrecy Performance Analysis of Adaptive SSKTransmission”

❖ Students who attended National Conferences/ Workshops and Presented Papers :



Naveenta Gautam attended conference “National Conference on Commuications (NCC) 2020” held at IIT Kharagpur frpom 21-23 February 2020.

She presented her paper “Blind channel coding identification of convolutional encoder and reed solomon encoder using neural networks”.



Mohina Gandhi attended conference “Platform economies in India” held at IIT Bombay from 26-27 February, 2020.

She presented her paper “Discontinuation of Social Media Platform: A study of TikTok on Generation Z of India”.



Ashish Kant Shukla attended conference “Vechicular Technology Conference Spring 2020” held at Antwerp, Belgium from 25-28 May 2020.

He got his paper published “Differential Modulation for Buffer-Aided Cooperative Relaying with Priority-Based Max Link Selection”.

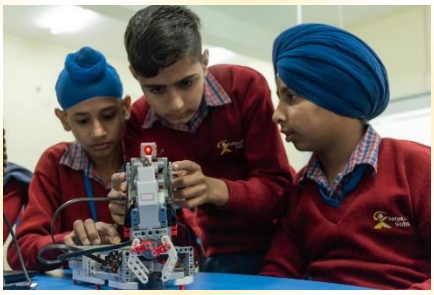
BHARTI FOUNDATION

Bharti Foundation, the philanthropic arm of Bharti Enterprises was set up in 2000. It implements and supports programs mainly on school education as well as on higher education and sanitation.



Satya Bharti School Program, the flagship initiative since 2006, has been providing free quality education to the rural underprivileged children with a special emphasis on inclusion and development of girl child. The program aims to deliver transformative education, with a holistic approach, so that the students become responsible and self-reliant citizens. The Program outreaches over 40,500 students (50.1% Girls) through 183 schools in six states.

Robotics Lab launched in Bharti Foundation's Senior Secondary School in Punjab



Bharti Foundation partnered with Ericsson to inaugurate **'The Robotic Lab'** at Satya Bharti Adarsh Senior Secondary School, Jhaneri, Punjab. The lab will benefit the students from Class IV to Class VIII and further stimulate their interest in science and technology. The program aims to introduce these students to the world of digital technology by improving their general understanding as well as providing hands-on experience in programming and digital tools. With Ericsson's ICT technology, this program will provide knowledge in the areas of new technologies, coding, programming and robotics among others.

Satya Bharti Quality Support Program (started 2013), which works in partnership with state governments for enhancing overall schooling experience for over 2,34,376 students (51% Girls) in 802 government schools in 14 states. Over 4,400 awards won by students at different levels. The average number of awards per school increased to more than 5 in 2019-20 from 2.5 in 2018-2019. Robust training initiatives have been undertaken across states for a holistic development of teachers and students. In a recent training, 1716 teachers from 11 districts in Jammu and Kashmir, underwent training on study/life skills reaching 1047 Secondary/Sen. Secondary schools (85%) in Jammu and Kashmir, wherein 11 districts. They will further train 17000+ students in two districts. Students from other districts will be covered in the coming months.

The sanitation initiative, **Satya Bharti Abhiyan** started in 2014, had been operational in the populous districts of Ludhiana and Amritsar, Punjab. The Abhiyan supported the Punjab government in enabling Ludhiana and Amritsar Districts to achieve Open Defecation Free status thus improving sanitation conditions.

For partnerships, please contact: partnership@bhartifoundation.org

**** Data as of September 30th 2020**

https://www.youtube.com/watch?v=i-NM4VODTBY (Link to our corporate film)

https://bhartifoundation.org/

https://www.linkedin.com/company/bharti-foundation

https://www.facebook.com/bhartifoundation/

https://twitter.com/bhartifdn

https://www.instagram.com/bhartifoundation/

Visit us at www.bhartischool.iitd.ac.in

Please write to us at : bharti.secretary@dbst.iitd.ac.in,

bhartischooloffice@gmail.com

Contact Number : 011-26596200

Contact us: Bharti School of Telecommunication Technology and Management

Room No. IIA-102, Bharti Building, IIT Delhi, Hauz Khas, New Delhi-110016