# ACADEMIC SCHOOLS

School of Computing and Electrical Engineering (SCEE)

The School of Computing and Electrical Engineering (SCEE) of IIT Mandi aims to maintain excellence in teaching and research in technologies related to Computing, Communication, Electronics and Electrical Engineering.

The School of Computing & Electrical Engineering has 33 Faculty members, 7 Staff Members, 65 Ph. D Students, 56 Masters students and 355 B.Tech Students. It has five broad areas namely Power Electronics & Drives, Controls & Sensors, VLSI, Signal Processing and Communications, Computer Science & Engineering.

The School offered two UG degrees namely B.Tech. in Computer Science & Engineering and Electrical Engineering. The School has three M.Tech. program namely in Power Electronics and Drives, Signal Processing & Communications, and VLSI in addition to regular PhD and MS by Research programs.
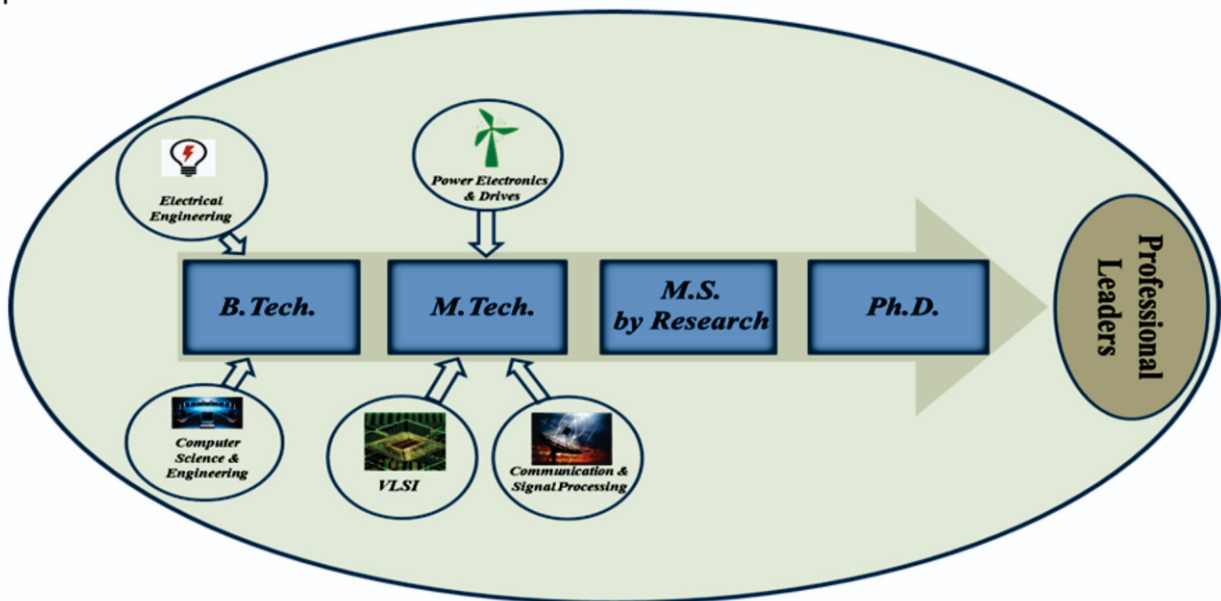
Degree programs offered by SCEE, IIT Mandi

Various programs in SCEE with their intake capacity and start of year

Program	Year of start	Intake Capacity
B. Tech. (Computer Science & Engineering)	2009	40
B. Tech. (Electrical Engineering)	2009	40
M. Tech. (VLSI)	2016	30
M. Tech. (Communication & Signal Processing)	2017	30
M. Tech. (Power Electronics & Drives)	2017	30
M.S. by Research	2010	As per the requirements
Ph.D.	2010	

The area of research covers a broad spectrum of theoretical and application-based topics such as: smart grid, renewable energy, materials for efficient semiconductor devices, next generation communication and efficient human-computer interaction etc.

At the undergraduate level, we emphasize the hands-on learning approach by providing students with a firm foundation of both the theory and practice of Computer Science and Electrical Engineering. We also have joint faculty positions with the School of Basic Sciences and School of Humanities to expose students to the social, ethical, and liberal education to make significant contributions to the society.

The first batch of B.Tech. Students completed their graduation and enter the world of innovation as capable engineers. At the post-graduate level our Faculty provide a deeper mastery of the basics and opportunities for research and professional capabilities for students in the field of Computer Science and Electrical Engineering.

Our Faculty are engaged in both practical and theoretical research, often in partnership with government agencies, private industry and non-governmental organizations. National and international collaborations are one of the prime focus of the faculty. This aims towards advancement of knowledge within our disciplines and also to contribute to society.

There was Rs. 9.8 core of External Funding in 2017-18. There were around 37 Journal Papers, and 64 Peer Reviewed Conference Papers, 3 book/book chapters and 7 patents filed in 2017-18

For more information

Website: http://iitmandi.ac.in/Schools/SCEE/index.php

Faculty

Dr. Bharat Singh Rajpurohit
Chairperson
Associate Professor
Specialisation: Power Electronics
Application to Power Systems
Ph.D. from IIT Kanpur in 2009
Home Town : Jodhpur, Rajasthan
Phone: 01905-267046
Email: bsr

Dr. Aditya Nigam
Assistant Professor
Specialisation: Biometrics, Computer Vision,
Image Processing
Ph.D. from IIT Kanpur
Home Town: Kanpur, UP
Phone: 01905-267152
Email: aditya

Dr. Arnav Bhavsar
Assistant Professor
Specialisation: Image analysis, Computer vision
Ph.D. from Indian Institute of Technology
Madras, Chennai, India (2011)
Home Town: Surat, Gujarat, India
Phone: 01905-267049
Email: arnav

Dr. Astrid Kiehn
Visiting Associate Professor
Specialisation: Distributed Algorithms,
Verification, Theoretical Computer Science
Ph.D. from TU-Munich University, Germany (1989)
Home Town: Hamburg, Germany
Phone: 01905-267053
Email: astrid

Dr. Bhakti Madhav Joshi
Assistant Professor
Specialisation: ac drives and control
Ph.D. from IIT Bombay in 2014
Home Town: Pune (Maharashtra)
Phone: 01905- 267051
Email: bhakti

Anil Kumar Sao
Associate Professor
Specialisation: Image processing
Ph.D. from Indian Institute of Technology
Madras, Chennai
Home Town : Bhilai, Chattisgarh
Phone: 01905-267066
Email: anil

Dr. Ankush Bag
Assistant Professor
Specialisation: Semiconductor Devices,
Epitaxy and Compound Semiconductors
Ph.D. from IIT Kharagpur (2016)
Home Town: Howrah, West Bengal
Phone: 01905-267276
Email: ankushbag

Dr. Arti Kashyap
Associate Professor (Joint Appointment)
Specialisation: Magnetism and magnetic
materials
Ph.D. from IIT Roorkee.
Home Town: Mandi, Himachal Pradesh
Phone: 01905-267042
Email: arti

Prof. B. D. Chaudhary
Emeritus Professor
Specialisation: Software Technology
Ph.D. from I.I.T. Kanpur in 1979 year
Home Town: Darbhanga, Bihar
Phone: 01905-267819
Email: bdchaudhary

Prof. Deepak Khemani
Professor (on deputation from IIT Madras)
Specialization: Artificial Intelligence
Ph.D. from IIT Bombay
Home Town:
Phone: 01905-267227
Email: khemani

Dr. Dileep A. D.
Assistant Professor
Specialisation: Pattern Recognition, Kernel Methods for Pattern Analysis, Machine Learning, Speech Technology, Computer Vision
Ph.D. From IIT Madras, Chennai in year 2013
Home Town: Udupi, Karnataka
Phone: 01905-267047
Email: addileep

Dr. Hitesh Shrimali
Assistant professor
Specialisation: Analog and mixed signal VLSI design, Analog-to-digital converters, Design and modeling of Radiation hard circuits
Ph.D. from: IIT Delhi
Home town: Ahmedabad, Gujarat
Phone: 01905-267259
Email: hitesh

Prof. Narendra Karmarkar
Visiting Distinguished Professor
Specialization:
Ph.D. from University of California (1983)
Home Town:
Email: narendrakarmarkar

Dr. Padmanabhan Rajan
Assistant Professor
Specialisation: Speech processing, speaker recognition
Ph.D. from IIT Madras in year 2012.
Home Town : Cochin, Kerala
Phone: 01905-267049 Email: padman

Dr. Rahul Shrestha
Assistant Professor
Specialization: VLSI Design and Circuits & Systems for Signal Processing and Wireless Communication.
Ph.D. from IIT Guwahati (2014)

Dr. Gopi Shrikanth Reddy
Assistant Professor
Specialization: Communications: Antennas and Wave Propagation, RF and Microwave Passive component Design
Ph.D. from IIT Bombay (2015)
Home Town: Jabalpur, Madhya Pradesh (Paternal Town: Telengana)
Phone:01905-267221
Email: gopishrikanth

Dr. Kunal Ghosh
Assistant Professor
Specialisation: Solar Photovoltaics
Ph.D. from Arizona State University, 2011
Home Town: Kolkata
Phone: 01905-267145
Email: kunal

Dr. Narsa Reddy Tummuru
Assistant Professor
Specialization: Hybrid Energy Storage Applications in Future Microgrids, Efficient Power Electronic Interfaces in Renewable Energy Applications and Smartgrid Communication Networks Ph.D. from IIT Madras (2015)
Home Town: Distt. Krishna, Andhra Pradesh
Phone: 01905-267225
Email: tummuru

Dr. Ramesh Oruganti
Emeritus Professor
Specialisation: Power Electronics, Solar photovoltaic energy systems
Ph.D. from Virgina Tech, America
Phone: 01905-267123
Email: ramesho

Dr. Renu M. Rameshan
Assistant Professor
Specialisation: Image Processing
Ph.D. from IIT Bombay in 2013
Home Town: Trivandrum, Kerala

Home Town: Bangalore, Karnataka
(Parental: Darjeeling, West Bengal)
Phone: 01905-267271
Email: rahul_shrestha

Phone: 01905-267051
Email: renumr

Dr. Samar Agnihotri
Assistant Professor
Specialisation: Information Theory,
Communication Complexity, Wireless
Communications
Ph.D. from Indian Institute of Science,
Bangalore in year 2009
Home town: Delhi
Phone: 01905-267107
Email: samar

Dr. Satinder Kumar Sharma
Associate Professor
Specialisation: Nanoelectronics,Sensors,
Photovoltaic& self-assembly.
Ph.D. from Kurukshetra University in 2007.
Home Town : Mandi, Himachal Pradesh
Phone: 01905-267134
Email: satinder

Dr. Satyajit Thakor
Assistant professor
Specialisation: Communication Theory,
Information Theory, Network Coding
Ph.D. from Institute for Telecommunications
Research, Uni. of South Australia in year 2012.
Home Town: Anand, Gujarat
Phone: 01905-267150
Email: satyajit

Dr. Shubhajit Roy Chowdhury
Assistant Professor
Specialisation: Biomedical Embedded Systems,
Non invasive diagnostic systems,
Near Infrared Spectroscopy, VLSI Architectures
Ph.D. from Jadavpur University (2010)
Home Town: Kolkata, West Bengal
Phone: 01905-267110
Email: src

Dr. Siddhartha Sarma
Assistant Professor
Specialization: Resource allocation in Wireless
Networks, Wireless Energy Harvesting and
Crowd sensing
Ph.D. from Indian Institute of Science
Home Town: Agartala, Tripura
Phone:01905-267116
Email: siddhartha

Dr. Srikant Srinivasan
Asst. Professor
Specialization: Big-Data acquisition and
analysis, Nanoelectronics, Spintronics
Ph.D. from Purdue University - West Lafayette,
USA (2012)
Home Town: Hyderabad
Phone: 01905-267222
Email: srikant

Dr. Sriram Kailasam
Assistant Professor
Specialisation: Distributed Systems (Cloud
Computing)
Ph.D. from Indian Institute of Technology
Madras (2014)
Home Town: Mumbai, Maharashtra
Phone: 01905-267120
Email: sriramk

Prof. Timothy A Gonsalves
Director & Professor
Specialisation: Computer networks and
distributed software systems
Ph.D. from Stanford University in 1986.
Home Town: Ooty, Tamil Nadu
Phone: 01905-267001, 7002
Email: tag

Dr. Tushar Jain
Assistant Professor
Specialisation: Control theory, fault tolerant control, industrial process control
Ph.D. from Université de Lorraine,
France (2012)Home Town: Meerut, Uttar Pradesh
Phone: 01905-267117
Email: tushar

Dr. Varun Dutt
Assistant Professor (Joint Appointment)
Specialisation: Artificial Intelligence,
Human-Computer Interaction, Judgment and
Decision Making, Environmental Decision Making
Ph.D. From Carnegie Mellon University (USA) in year 2011
Home Town: Lucknow, Uttar Pradesh
Phone: 01905-267041
Email: varun

Dr. Yvonne Dittrich
Adjunct Professor
Specialisation:
Ph.D. from University of Hamburg in year 1997
Home Town: Copenhagen
Phone:
Email: ydi

Dr. Pooja Vyavahare
DST INSPIRE Faculty Fellow
Specialization: Distributed Computation, Network Analysis, Algorithm Design
PhD from IIT Bombay (2016)
Home Town: Indore, Madhya Pradesh
Phone: 267053
Email: pooja_vyavahare

Mentor Faculty

Prof. Enakshi Bhattacharya
Mentor Professor
Specialization: MEMS processing and sensors
PhD from TIFR, Bombay
Email:enakshi

Prof. Hema A Murthy
Mentor Professor
Specialisation: Speech, Signal processing, Computer networks
Ph.D. from IIT Madras, 1992
Email: hema

Dr. Sanjeev Manhas
Mentor Assistant Professor
Ph. D. from De Montfort University, Leicester,
UK in Electronics and Electrical Engineering, 2003
Phone: +91-1332-28517
Email: samanfec

Research Projects

1. New Projects:

Names of PI, Co-PI, funding agencies and amount of grant received and amount spent etc.

Externally Sponsored Research Projects:

S. No.	Project Title	Sponsoring Agency	Investigator	Amount Sanctioned in Rs.	Duration of Project
1	Development of Gallium oxide based next generation power and sensor device Date of Sanction: 28.09.17 Date of Completion: 27.09.20	SERB	Dr. Ankush Bag	51,85,400	3 Years
2	Development and evaluation of low -cost landslide early warning solutions Date of Sanction: 06.10.17 Date of Completion: 05.10.20	DRDO-DTRL	Dr. Varun Dutt (PI),Dr. Venkata Uday Kala (Co-PI)	9,99,460	3 Years
3	Study and design of broad band frequency selective surface (FSS) structures for various RF and microwave applications Date of Sanction: 09.11.17 Date of Completion: 08.11.20	SERB	Dr. Gopi Shrikanth Reddy	51,97,910	3 Years
4	Development of modern state-of-the-Art digital Forensic facilities in Forensic science laboratories in Himachal Pradesh Date of Sanction: 24.04.17 Date of Completion: 23.04.19	Regional Forensic Science Laboratory (RFSL)	Dr. Arnav Bhavsar(PI-Mr. Rajesh Verma (PI) from RFSL, Dr. Anil K Sao, Dr. Renu Rameshan, Dr, Padmanabhan Rajan, Dr. A.D. Dileep, Dr. Aditya Nigam (Co-PI's)	12,00,000	2 Years
5	Development and evaluation of low-cost landslide monitoring solutions Date of Sanction: 11.12.17 Date of Completion: 10.12.19	NMDA	Dr. Varun Dutt (PI) and Dr. Venkata Uday Kala (Co-PI)	27,85,080	3 Years
6	Photo- catalytic treatment of wastewater for the removal of Azo dyes: using rGO- TiO_2 based cost effective composite technology Date of Sanction: 06.01.18 Date of Completion: 05.01.20	Himachal Pradesh State council for Science, Technology & Environment (SCSTE)	Dr. Satinder Kumar Sharma (PI), Dr. Venkata Krishnan (Co-PI)	5,88,000	2 Years

7	A low cost high efficiency renewable energy based hybrid power conversion system for rural Himachal residential application Date of Sanction: 14.03.18 Date of Completion: 13.03.20	Himachal Pradesh State council for Science, Technology & Environment (SCSTE)	Dr. Narsa Reddy Tummuru	6,50,000	2 Years
8	Smart Agriculture: Farmer Zone Date of Sanction: 23.03.18 Date of Completion: 22.03.21	DBT	Dr. Srikant Srinivasan (PI), Dr. Renu M.R, Dr. Siddhartha Sarma, Dr. A.D. Dileep, Dr. Shyam Kumar Masakapalli, Dr. Shyamasree Dasgupta (Co-PI's) from IIT Mandi AND Dr. S.K. Chakrabarti (PI) from CPCRI, Shimla, Dr. Tina Barsby (PI) from NIAB(UK) AND Dr. Andre Laperriere (PI) from GODAN (USA) AND Dr. David Hughes (PI) from University of Pennsylvania	9,47,76,400	3 Years
9	Detection and quantification of dicentric chromosomes from captured images for triage biodosimetry application Date of Sanction: 07.02.18 Date of Completion: 06.08.19	INMAS-DRDO	Dr. Anil K Sao(PI) Dr. Arnav Bhavsar (Co-PI)	8,67,900	18 Months
10	Development of low cost accelerated water purification systems with added mineralisation for himalayan region Date of Sanction: 01.04.18 Date of Completion: 31.03.21	NMHS	Dr. Jaspreet Kaur Randhawa (PI) Dr. Bharat Singh Rajpurohit,Dr. Samar Agnihotri (Co-PI's)	40,66,000	3 Years

Seed Grant Projects

Sr. No.	Projects Title	File No.	Investigator	Amount Sanctioned in Rs.	Duration of Project
1	Material to control strategies for hybrid energy storage system AC-DC microgrid perspective Date of Sanction: 28.10.16 Date of Completion: 27.10.19	IITM/SG/NRT/58	Dr. Narsa Reddy Tummuru	15,50,000	3 years
2	Broad- band electrically small antennas for various RF and Microwave- application Date of Sanction: 07.12.16 Date of Completion: 06.12.19	IITM/SG/GSR/61	Dr. Gopi Shrikanth Reddy	5,53,675	3 years
3	Developing a low-cost, scalable and resilient agricultural internet-of- thing framework	IITM/SG/SS/62	Dr. Srikant Srinivasan	15,00,000	3 years
4	ASIC implementation of hardware-efficient & low-power spectrum sensor based on cyclosationary feature detection for congnitive radio mobile-broadband system	IITM/SG/RSh/64	Dr. Rahul Shrestha	10,00,000	3 years

Sponsored Consultancy Research Projects

S.No.	Proposal Title	Faculty name	Agreement signed with	Amount Sanctioned in Rs.	Period
1	Matlab simulation of battery energy storage system(BESS) for 17 MW solar PV plant Signing Date- 17.06.17 Completion Date- 26.06.17	Dr. Bhakti Joshi	Amber Aziz, Raychem RPG(RIC), Halol, Vadodara, Gujrat	1,77,600	10 Days
2	Application for mining rare diseases and analyzing and predicting patient journeys Signing Date- 10.08.17 Completion Date- 31.12.18	Dr. Varun Dutt	Rx Data Science Inc, USA	US$ 21,667.152	17 Months
3	Automotive antenna design review Signing Date- 01.10.17 Completion Date- 30.03.18	Dr. Gopi Shrikanth Reddy	Ineda Systems Pvt. Ltd, E-Park, Cyberabad, Hyderabad	1,07,380	6 Months

2. **Major Research Achievements including Products/Technologies developed/ ISTP/ DP/ MTP Outcome:**

1. The Applied Cognitive Laboratory, SCEE, IIT Mandi in collaboration with the Construction Material laboratory, SE, IIT Mandi has recently developed a low-cost microelectromechanical system (MEMS) landslide monitoring and warning system. This system makes use of low-cost microelectromechanical systems (MEMS) - based sensors for local site-specific monitoring of landslides at every 10 minute interval. A prototypical low-cost system is

currently installed on a hill on the Kamand - Kataula road (near IIT Mandi campus). This technology may be replicated in other landslide-prone areas in India and world in the long term. This project is funded by the State Council for Science, Technology, and Environment, HP Government and DTRL, DRDO.

Team members with the landslide monitoring station at Salgi village against the IIT Mandi's North campus backdrop.

Sensors with wires and the microcontroller box deployed at a landslide site on IIT Mandi's South campus

2) **Development of human-performance modeling framework via physiological and signal processing tools for visual cognitive enhancement in IVD, VR and AR paradigms**: The Applied Cognitive Laboratory, SCEE, IIT Mandi in collaboration with Defense Research and Development Organization (DRDO) developed a human performance modeling framework for achieving cognitive enhancement using IVD, VR and AR as a training and assessment module for the Indian Army. The human performance model consists of cognitive-profiling and training modules in IVD, VR and AR. The cognitive profiling and training modules were prepared with the objective of performance assessment and for performance improvement during simulation-based training. The simulations used for profiling and training the army consisted of manned / unmanned modes (with all the human factors issues in the unmanned/manned interfaces integrated), search (reconnaissance) / shoot (destroy) modes, easy / difficult task-complexity modes (based upon enemy's artificial intelligence), variable dynamicity of targets and different technological interfaces. The cognitive-profiling module accounted for various psychological, physiological, behavioral, ergonomic, and neurological descriptors of performance.

3. Publications:

Patents/Books/Book Chapters/ Papers National and Internationals journals/conferences.

1. S. Karmakar Ghosh, V. Thakur, S. Roy chowdhury "Design and simulation of Helmholtz coil and Maxwell coil for low cost low magnetic field MRI machine", Advanced Materials Proceedings, Accepted for publication.

2. N. Govil, R. Shrestha, S. Roy Chowdhury, "PGMA: An Algorithmic Approach for Multi-objective Hardware Software Partitioning", Microprocessors and Microsystems, Vol. 54, pp. 83-96, 2017.

3. P. Sharma, V. Abrol, A D Dileep and A. K. Sao, "Sparse coding based features for speech units classification", Computer Speech and Language, Volume 47 Issue C, January 2018 Pages 333-350.

4. P. Sharma, V. Abrol and A. K. Sao, "Deep sparse representation based features for speech recognition", IEEE Trans. Audio Speech and Language Processing 25(11): 2162-2175 (2017).

5. S. Thakor, T. Chan, A. Grant, "Capacity Bounds for Networks with Correlated Sources and Characterisation of Distributions by Entropies," in IEEE Transactions on Information Theory, vol. 63, no. 6, pp. 3540-3553, June 2017.

6. P. Kumar, S. Thakor, "Performance of OFDM-FSO link with Analog Network Coding," in Photonic Network Communications, Journal Photonic Network Communications, vol. 35, no. 2, pp. 210-224, 2018.

7. S. Kharche, G. Shrikanth reddy, R. Gupta, Jayanta Mukherjee, " A wideband Circularly Polarized Diversity Antenna for Satellite and Mobile Communication", IET Microwaves, Antennas & Propagation, vol. 11, pp. 1861 - 1867, 2017.

8. G. Shrikanth Reddy, S. Kharche, "Elliptical UWB Antenna loaded with Rectangular Split Loop Resonator (RSLR) and Semi-Elliptical Slot for Multi band Rejection",IEEE International Conference on Antenna Innovations and Modern Technologies (iAIM-2017) Bangaluru, India, (Best paper).

9. S. Kharche, G. Shrikanth Reddy, J Mukherjee, R K Gupta, "Mutual Coupling Reduction by using tilted Variable Length SRR like structure in UWB MIMO Antennas", IEEE AP-S Symposium on Antennas and Propagation and URSI CNC/USNC Joint Meeting 2017.

10. Sangar S., Dutt, V. & Thakur, R. (2018). Economic burden, impoverishment and coping mechanisms associated with out-of-pocket health expenditure: analysis of rural-urban differentials in India. Journal of Public Health, Springer.

11. Kumar, M., and Dutt, V., "Experience in a Climate Microworld: Influence of Surface and Structure Learning, Problem Difficulty, and Decision Aids in Reducing Stock-Flow misconceptions". Frontiers in Psychology (2018).

12. Sharma, N., & Dutt, V. (2017). Modeling decisions from experience: How models with a set of parameters for aggregate choices explain individual choices. Journal of Dynamic Decision Making, 3(3).

13. Sharma, N., Debnath, S. & Dutt, V. (in-press). Description-Experience Gap depends upon Choice-Set Size: Evidence from Investment Problems. Frontiers in Cognitive Science.

14. Murty and Rahul Shrestha, "Hardware Implementation and VLSI Design of Spectrum Sensor for Next-Generation LTE-A Cognitive-Radio Wireless-Network," IET Circuits, Devices and Systems, Available Online (10.1049/iet-cds.2017.0292), February-2018.

15. Mahesh S. Murty and Rahul Shrestha, "Reconfigurable & Memory-Efficient Cyclostationary Spectrum Sensor for Cognitive-Radio Wireless Networks," IEEE Transactions on Circuits and Systems II: Express Briefs, Early Access (10.1109/TCSII.2018.2790952), January-2018.

16. Naman Govil, Rahul Shrestha and Shubhajit Roy Chowdhury, "PGMA: An Algorithmic Approach for Multi-objective Hardware Software Partitioning," Journal of Microprocessors and Microsystems: Embedded Hardware Design (MICPRO) - Elsevier, Volume: 54, pp. 83-96, October-2017.

17. Kusmec, S Srinivasan, D Nettleton, PS Schnable (2017) Distinct genetic architectures for phenotype means and plasticities in Zea mays. Nat Plants, 3(9): 715-723. (Selected by journal editors for a commentary written by Bruce Walsh (https://www.nature.com/articles/s41477-017-0012-x;) Selected as an Editors' Choice by MaizeGDB, 10/2017 ; Gage JL et al, (2017) The effect of artificial selection on phenotypic plasticity in maize. Nat Commun, 8(1): 1348.

18. Saptarsi Ghosh, Subhashis Das, Syed Mukulika Dinara, Ankush Bag, Apurba Chakraborty, Partha Mukhopadhyay, Sanjay Kumar Jana , and Dhrubes Biswas, " OFF-state Leakage and Current Collapse in AlGaN/GaN HEMTs: a Virtual Gate Induced by Dislocations ", IEEE Transactions on Electron Devices, 65 (2018) 1333-1339.

19. Apurba Chakraborty, Ankush Bag, Partha Mukhopadhyay, Saptarsi Ghosh, and Dhrubes Biswas, " Elimination of V-shaped pits in InGaN/GaN/AlN/GaN heterostructure by metal modulation growth technique ", Semiconductor Science and Technology, 33 (2018) 036009.

20. Apurba Chakraborty, Saptarsi Ghosh, Partha Mukhopadhyay, Subhashis Das, Ankush Bag, and Dhrubes Biswas, " Effect of trapped charge in AlGaN/GaN and AlGaN/InGaN/GaN heterostructure by temperature dependent threshold voltage analysis ", Superlattices and Microstructures, 113 (2018) 147 – 152.

21. Subhashis Das, Saptarsi Ghosh, Rahul Kumar, Ankush Bag, and Dhrubes Biswas, " Highly Sensitive Acetone Sensor Based on Pd/AlGaN/GaN Resistive Device Grown by Plasma-assisted Molecular Beam Epitaxy ", IEEE Transaction on Electron Devices, 64 (2017)4650 - 4656.

22. Subhankar Majumdar, Ankush Bag, and Dhrubes Biswas, "Comparative Analysis of Parameter Extraction Techniques for AlGaN/GaN HEMT on silicon/sapphire substrate", Microelectronics Reliability, 78 (2017) 389-395.

23. Ankush Bag, Subhankar Majumdar, Subhashis Das and Dhrubes Biswas, "Probing InGaN immiscibility at AlGaN/InGaN heterointerface on silicon (111) through two-step capacitance-voltage and conductance-voltage profiles ", Materials & Design, 133 (2017) 176-185.

24. S. Sharma, S. Das, H. Shrimali and S. K. Sharma, "High-Performance CSA-PANI based Organic Phototransistor by Elastomer Gratings" in Elsevier Journal of Organic Electronics

(accepted).

25. Yadav, H. Shrimali, A.Andreazza, V. Liberali, "Analytical Expressions for Noise and Crosstalk Voltages of the High Energy Silicon Particle Detector", Journal of Instrumentation, Institute of Physics (IOP) science, vol. 13, Jan. 2018, pp. C01019.

26. S. Sharma, R. Khosla, D. Deva,H. Shrimali and S. K. Sharma, "Fluorine-chlorine co-doped TiO2/CSA doped polyaniline based high performance inorganic/organic hybrid heterostructure for UV photodetection applications" in Elsevier Sensors & Actuators: A. physical, vol. 261, Jul. 2017, pp. 94-102.

27. A. Joshi, H. Shrimali and S. K. Sharma, "A Systematic Design Approach for a Gain Boosted Telescopic OTA with Cross Coupled Capacitor" in IET Circuits, Devices & Systems, Vol. 11, issue 3, Jun. 2017, pp. 225 - 231.

28. A. Bhardwaj and S. Agnihotri. Energy- and spectral- efficiency tradeoff for D2D-multicasts in underlay cellular networks. To appear in IEEE Wireless Comm. Letters. DOI: 10.1109/LWC.2018.2794353.

29. A. Bhardwaj and S. Agnihotri. Channel allocation for multiple D2D-multicasts in underlay cellular networks using outage probability minimization. National Conference on Communications (NCC) 2018, Hyderabad, India, Feb. 2018.

30. G.S. Grewal & B.S. Rajpurohit, "Field Computation of Efficiency of Induction Machine Working on Unbalanced Conditions using modified Non-Intrusive Air-Gap Method", CPRI Journal, vol. 12, issue 1, 2017.

31. R. K. Chauhan, B. S. Rajpurohit, S. N. Singh, F. M. Gonzalez-Longatt and L. Wang, " Real Time Energy Management System for Smart Buildings to Minimize the Electricity Bill," International Journal of Emerging Electric Power Systems, vol. 18, issue 3, 2017.

32. Chitaranjan Phurailatpam and B. S. Rajpurohit, "Planning and Optimization of Autonomous DC Microgrids for Rural and Urban Applications in India", Renewable & Sustainable Energy Reviews, Elsevier, vol. 82, part 1, pp.194-204.

33. G.S. Grewal & B. S. Rajpurohit, " Efficiency determination of in-service induction machines using gravitational search optimization Measurement", Measurement, Journal of the International Measurement Confederation (IMEKO), Elsevier, Vol. 118, 2018, pp 156-163.

34. A. Sharma, B. S. Rajpuohit, "A Review on Economics of Power Quality: Impact, Assessment and Mitigation", Journal of Renewable & Sustainable Energy Reviews.

35. G.S. Grewal & B.S. Rajpurohit, "A novel computational intelligence technique for in-service efficiency estimation of induction machines", Measurement Journal, Elsevier, Vol. 118, pp. 156-163, January 2018. ISSN: 0263-2241.

36. A. K. Mishra, B. S. Rajpurohit and R. Kumar, "Induction Machine Drive Design for Enhanced Torque Profile," in IEEE Transactions on Industry Applications, vol. 52, issue. 2, pp. 1283-1291, Mar./Apr. 2018.

Patents

1.   Dutt, V., Chaturvedi, P., Agrawal, K., Agrawal, S., Mali, N., & Kala, U. (2017). Low-cost sensor-based system for landslide monitoring and alerts, Patent Application 201711045337. New Delhi, Paten Office Dwarka New Delhi 110078, 2017/12/18.

2.   Dutt, V., Chaturvedi, P., Agrawal, K., Agrawal, S., Mali, N., & Kala, U. (2018). Low-cost sensor-based system for landslide monitoring and alerts, Patent Application PCT/IN2018/050217-PCT-VD-01. International Bureau, World Intellectual Property Organization 34, Chemin des Colombettes, P.O. Box 18, CH-1211 Geneva 20 Switzerland, 2018/04/16 (International Patent Filed).

3.   Adarsh Natarajan, Harinaryan K, Nirmal, A. K. Sao, A. Bhavasar, K Gupta, S. Gautam, A method for medical screeening and a system thereof", file no. 2599/CHE/2015.

Book/Book Chapters Published

1.   S. Roy Chowdhury, G. Sharma, Y. Arora, L.V.R. Prasadaraju, M. Anumukonda, S. Ramasahayam, "Smart circuits for signal conditioning of wearable medical sensors", Chapter-3 in the book titled Wearable Sensors: Application, Design and Implementation, edited by S.C. Mukhopadhyay and T. Islam, pp. 3.1-3.28, IoP Publishing, 2017.

2.   Yadav, S., Kumar, S., Chaturvedi, P., Thakur, K.K., Mali, N., Kala, V.U., and Dutt, V. (2018). IoT-Landslides: A Low-Cost Internet of Things Framework for Landslide Prediction and Risk Communication. In Internet of Things Concepts, Technologies, Applications, and Implementations. CRC Press.

3.   Jain, T., Yamé, J.J. and Sauter, D., 2018. Active Fault-tolerant Control Systems: A Behavioral System Theoretic Perspective (Vol. 128), Studies in Systems, Decision and Control. Springer International Publishing.

Conferences Attended and Paper Presented

1.   Astrid Kiehn attend the workshop on FSTTCS 2017 (Foundations of Software Technology and Theoretical Computer Science) in 11-15 December 2017 held at IIT Kanpur.

2.   S. Ghosh, V. Thakur, S. Roy Chowdhury, "Design of a low cost low magnetic field MRI system", 11th IEEE International Conference on Sensing Technology (ICST) 2017, Sydney, December 4-6, 2017.

3.   N. Bhandari, S. Roy Chowdhury, "FPGA based High Performance Asynchronous Finite State Machine based on Modified 4 Phase Handshaking Protocol", 3rd International Conference on Nanoelectronics, Circuits and Communication Systems, Ranchi, November 11-12, 2017.

4.   S. Dagar, S. Roy Chowdhury, S. Bapi Raju, A. Dutta, D. Roy, "A computational investigation on using the Excitation-Inhibition (E/I balance) mechanism to optimize tDCS protocol", 4th Annual Conference on Cognitive Science, University of Hyderabad, October 5-7, 2017.

5.   N. Govil, R. Shrestha, S. Roy Chowdhury, "A new multi-objective Hardware-Software Partitioning Algorithmic approach for High Speed application", 21st VLSI Design and Test Symposium, IIT Roorkee, June 29 - July 02, 2017.

6.   N. Paradkar, S. Roy Chowdhury, "Cardiac Arrhythmia Detection using Photoplethysmography",

37th IEEE Annual International Conference on Engineering in Medicine and Biology Society, Jeju Island, South Korea, July 11-15, 2017.

7. N. Paradkar, S. Roy Chowdhury, "Coronary Artery Disease Detection using Photoplethysmography", 37th IEEE Annual International Conference on Engineering in Medicine and Biology Society, Jeju Island, South Korea, July 11-15, 2017.

8. S. Ghosh, V. Thakur, S. Roy Chowdhury, "Design and Simulation of Helmholtz Coil for low cost and low magnetic field MRI system", European Sensors and Actuators Summit 2017, Stockholm, August 22-24, 2017.

9. Debadatta Dash, Vinayak Abrol, Anil Kumar Sao, 'EVD assisted ICA of optimally thresholded rs-fMRI', BrainModes , India, PID-19, p49, December 11-14, 2017, (Extended Abstract).

10. K. Gupta, A. Bhavsar, A. K. Sao, "CNN based Mitotic HEp-2 Cells Detection for Diagnosis of Auto-Immune Disorders ", Accepted for 5th Intl. Conf. On BIOIMAGING 2018.

11. K. Gupta, A. Bhavsar, A. K. Sao, "Mitotic Cells Detection for HEp-2 Specimen Images using Threshold-based Evaluation Scheme ", Accepted for SPIE Medical Imag ing 2018.

12. S. Gautam, A. Bhavsar, A. K. Sao, "CNN based Segmentation of Nuclei in PAP- Smear Images with Selective Pre-processing ", Accepted for SPIE Medical Imaging 2018.

13. S. Gautam, K. Gupta, A. Bhavsar, A. K. Sao, "Unsupervised Segmentation of Cer- vical Cell Nuclei via Adaptive Clustering ", in Proc. Medical Image Understanding and Analysis (MIUA 2017), Edinburgh, UK, July 2017.

14. P. Kaur, S. Mandal and A. K. Sao, " Significance of Magnetic Resonance Image Details in Sparse Representation Based Super Resolution ", in Proc. 21st Annual Conference, Medical Image Understanding and Analysis (MIUA), Edinburgh, UK, July 11-13, 2017

15. S. Thakor, T. Chan, A. Grant, "A Minimal Set of Shannon-type Inequalities for Functional Dependence Structures," in International Symposium on Information Theory (ISIT), pp. 679-683, Aachen, Germany, June 2017.

16. Agrawal, K., Baweja. Y, Dwivedi, D. , Saha, R., Prasad, P., Agrawal,S.,Kapoor,S., et al. "A Comparison of Class Imbalance Techniques for Real-World Landslide Predictions." International Conference on Machine Learning and Data Science. December 2017 (Accepted for Publication).

17. Kaushik,S., Choudhury, A., Viswanathan,K., Chellappa,B., Natarajan, S., Pickett,L., and Dutt, V.."Using LSTMs for Predicting Patient's Expenditure on Medications".International Conference on Machine Learning and Data Science. December 2017 (Accepted for Publication).

18. Sharma, N., & Dutt, V. Modeling Choice Variation in Search Strategies with Multi-armed Bandit Problems.International Conference on Machine Learning and Data Science. December 2017 (Accepted for Publication).

19. Kaushal, K. K, Kaushik,S., Choudhury, A., Viswanathan,K., Chellappa,B., Natarajan, S., Pickett,L., and Dutt, V. "Patient Journey Visualizer: A Tool for Visualizing Patient Journeys." International Conference on Machine Learning and Data Science. December 2017

(Accepted for Publication).

20. Singal, H., Aggarwal, P., & Dutt, V. Modeling Decisions in Games Using Reinforcement Learning. learning, 25, 26. International Conference on Machine Learning and Data Science. December 2017 (Accepted for Publication).

21. Sharma, G., Kaushal, Y., Chandra, S., Singh, V., Mittal, A. P., & Dutt, V. (2017). Corrigendum: Influence of Landmarks on Wayfinding and Brain Connectivity in Immersive Virtual Reality Environment. Frontiers in psychology, 8, 1514.

22. Choudhury, A., Kaushik, S., & Dutt, V. (2017, July). Social-Network Analysis for Pain Medications: Influential physicians may not be high-volume prescribers. In Proceedings of the 2017 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining 2017 (pp. 881-885). ACM.

23. Sharma, N., & Dutt, V. (2017). Decisions from Experience: Modeling Choices due to Variation in Search Strategies. 15th International Conference on Cognitive Modelling, Coventry, United Kingdom.

24. Sharma, G., Kaushal, Y., Chandra, S., Singh, V., Mittal, A. P., & Dutt, V. (2017). Influence of Landmarks on Wayfinding and Brain Connectivity in Immersive Virtual Reality Environment. Frontiers in psychology, 8, 1220.

25. Aggarwal, P, Gonzalez, C and Dutt, V. "Modeling the effects of amount and timing of deception in simulated network scenarios." In Cyber Situational Awareness, Data Analytics And Assessment (Cyber SA), 2017 International Conference On, pp. 1-7. IEEE, 2017.

26. Mahesh S. Murty and Rahul Shrestha, "Hardware-Efficient and Wide-Band Frequency-Domain Energy Detector for Cognitive-RadioWireless Network," 31st IEEE International Conference on VLSI Design and 17th International Conference on Embedded Systems (VLSID), pp. 277-282, January-2018.

27. Dinesh Kumar B., Sumit Pandey, Puneet Arora and Rahul Shrestha, "A Self-Bandwidth Switching & Area-Efficient PLL Using Multiplexer-Controlled Frequency Selector," 7th IEEE International Symposium on Embedded Computing and System Design (ISED), pp. 1-5, December-2017.

28. Rahul Kurzekar, Hardik Arora and Rahul Shrestha, "Embedded Hardware Prototype for Gas Detection and Monitoring System in Android Mobile Platform," 3rd IEEE International Symposium on Nanoelectronic and Information Systems (iNIS), pp. 6-10, December-2017.

29. Sumanth Gudaparthi and Rahul Shrestha, "Energy-Efficient VLSI Architecture & Implementation of Bi-Modal Multi-Banked Register-File Organization," 21st IEEE International Symposium on VLSI Design and Test (VDAT), pp. 299-312, December-2017.

30. Naman Govil, Rahul Shrestha and Shubhajit Roy Chowdhury, "A New Multi-Objective Hardware-Software-Partitioning Algorithmic Approach for High Speed Applications," 21st IEEE International Symposium on VLSI Design and Test (VDAT), pp. 62-68, December-2017.

31. Rahul Shrestha, "High-Speed and Low-Power VLSI-Architecture for Inexact Speculative Adder," IEEE International Symposium on VLSI Design, Automation and Test (VLSI-DAT),

pp. 1-4, April-2017, Taiwan (Hsinchu), web link.

32. H. Shrimali, V.Sharma, J. Tripathi, R. Malik, "Nonlinear Modeling and Analysis of Buck Converter using Volterra Series" in IEEE International Conference on Electronics Circuits and Systems (ICECS), Batumi, Georgia, Dec. 5-8, 2017.

33. V.Sharma, J. Tripathi,H. Shrimali, R. Malik, "The Harmonics Impact Study of a DC-DC Buck Converter through a Power Delivery Network" in the IEEE Electrical Design of Advanced Packaging and Systems (EDAPS) Symposium, Hangzhou, China, Dec. 14-16, 2017.

34. Dinesh Kumar B.,H. Shrimali, "Design of a 520 µW, –141 dBc/Hz and 450 MHz Frequency Synthesizer using Low Power and Low Phase Noise Current Reuse VCO" in IEEE TENCON, Penang, Malaysia, Nov 5-8, 2017.

35. V.Sharma,H. Shrimali, J. Tripathi, R. Malik, "Distortion Analysis for a DC-DC Buck Converter" in the International SoC design conference (ISOCC), Seoul, Korea, Nov 5-8, 2017 (Got the ISOCC Best Paper Award).

36. H. Shrimali, A. Joshi, E. Ruscino, I. Yadav, S. K. Sharma, A. Andreazza, V. Liberali, "Design of a Charge Sensitive Amplifier for Particle Detection Application in BCD 180~nm Technology" in the International Workshops on Radiation Imaging Detectors (iWoRid), Krakow, Poland, July 2-6, 2017.

37. A. Yadav, H. Shrimali, A. Andreazza, V. Liberali, "Analytical Expressions for Noise and Crosstalk Voltages of the High Energy Silicon Particle Detector" in the International Workshops on Radiation Imaging Detectors (iWoRid), Krakow, Poland, July 2-6, 2017.

38. S. Gautam, A. Bhavsar, A. Sao. K. Harinarayan. "CNN based segmentation of nuclei in PAP-smear images with selective pre-processing". SPIE Medical Imaging (Digital Pathology), 2018.

39. K. Gupta, A. Bhavsar, A. Sao. "Mitotic cells detection for HEp-2 specimen images using threshold-based evaluation scheme". SPIE Medical Imaging (Digital Pathology), 2018.

40. K. Gupta, A. Bhavsar, A. Sao. "CNN based Mitotic HEp-2 Cell Image Detection". Bioimaging 2018.

41. K. Gupta, A. Bhavsar, A. Sao. "Mitotic v/s non-mitotic HEp-2 cells classification for CAD based auto-immune disorder detection: A study using CNN". CODS-COMAD, 2018.

42. A. Balure, A. Bhavsar, R. Kini. "GMM based single depth image super-resolution". NCVPRIPG 2017.

43. S. Kumari, S. Mandal, A. Bhavsar. "Patch similarity in transform domain for intensity range image denoising with edge preservation". NCVPRIPG 2017.

44. V. Gupta, A. Singh, K. Sharma, A. Bhavsar. "Automated classification for breast cancer histopathology images: Is stain normalization important?". Medical Image Computation and Computer Assisted Intervenstion, CLIP Workshop (MICCAIW 2017), 2017.

45. R. Kumar, A. Kumar, A. Bhavsar. "Bird Region Detection in Images with Multi-scale HOG Features and SVM Scoring". International Conference on Computer Vision and Image Processing (CVIP 2017), 2017.

46.   S. Jafar, P. Singh, A. Bhavsar. "Temporal activity segmentation for depth cameras using joint-angle variance features". International Conference on Computer Vision and Image Processing (CVIP 2017), 2017.

47.   V. Gupta, A. Bhavsar. "An integrated multi-scale model for breast cancer histopathological image classification with joint colour-texture features". International Conference on Computer Analysis of Images and Patterns (CAIP 2017), 2017.

48.   V. Gupta, A. Bhavsar. "Breast cancer histopathological image classification: Is magnification important?". IEEE Conference on Computer Vision and Pattern Recognition, CVMI workshop (CVPRW 2017), 2017.

49.   V. Gupta, A. Bhavsar. "Random forest-based feature importance for HEp-2 cell image classification". International Conference on Medical Image Understanding and Analysis (MIUA 2017), 2017.

50.   S. Gautam, K. Gupta, A. Bhavsar, A. K. Sao. "Unsupervised segmentation of cervical cell nuclei via adaptive clustering". International Conference on Medical Image Understanding and Analysis (MIUA 2017), 2017.

51.   R. M. Pindoriya, A. Usman, B. S. Rajpurohit and R. Kumar, "PMSG Based Wind Energy Generation System:Energy Maximization and its control", IEEE ICPS 2017, College of Engineering, Pune, India, Dec. 21-23, 2017, pp. 1-6, 2017.

52.   A. Sharma, A. K. Mishra, B. S. Rajpurohit and K. N. Srivastava, "Power Quality Enhancement at PCC for PMSM based Adjustable Speed Drive Load", IEEE ICPS 2017, College of Engineering, Pune, India, Dec. 21-23, 2017, pp. 1-6, 2017.

53.   A. Usman, B. M. Joshi and B. S. Rajpurohit, "Review of fault modeling methods for permanent magnet synchronous motors and their comparison," 2017 IEEE 11th International Symposium on Diagnostics for Electrical Machines, Power Electronics and Drives (SDEMPED), Tinos, 2017, pp. 141-146.

54.   R.M. Pindoriya, B. S. Rajpurohit, R. Kumar and K. N. Srivastva,"Comparative Analysis of Permanent Magnet Motors and Switched Reluctance Motors Capabilities for Electric and Hybrid Electric Vehicles", IEEE Engineer Infinite International Conference, 13-14 March, 2018, Greater Noida, Delhi, India.

55.   M. Sharma and B. S. Rajpurohit, "Minimization in the Price of Electricity Bills of Consumers using MILP", IEEE Engineer Infinite International Conference, 13-14 March, 2018, Greater Noida, Delhi, India.

56.   A. Usman, B. S. Rajpurohit, "Finite Element Modeling of Demagnetization Fault in Permanent Magnet Direct Current Motors", IEEE PESGM 2018, Portland, USA, August 05-10, 2018 (Accepted).

4.   Outreach/Continuing Education Activities organized: (Workshops/conferences etc. details with high resolution photographs).

1.   Organized a 12 days MIT IIT Bootcamp on Innovation technologies in collaboration with IIT Delhi, MIT, USA and Asian School of Business Kuala Lumpur from June 22, 2017 to July 04, 2017. The workshop was attended by 55 participants including 25 participants from USA,

Malayasia and Australia. The workshop was organized with support from MHRD through the Design and Innovation Center. (Pics attached).

2.   **Workshop on machine learning and medical image analysis. WMLMIA 17, June 17-22**

Coordinators: Dr. Anil Kumar Sao, Co-cordinatore: Dr. Padmanabhan Rajan

The Multimedia Analytics and Systems group of the School of Computing and Electrical Engineering at IIT Mandi organised the third Workshop on Machine Learning for Medical Image Analysis (WMLMIA 2017.) The five day workshop focused on the use of machine learning for analysing microscopy images. The workshop was held between 17-21 June, 2017 at the Kamand campus, IIT Mandi. Machine learning is an active research area, where computer algorithms "learn", in a manner analogous to humans. Several research groups, both in academia and industry, the world over, are studying new and effective ways of utilising machine learning to automate the analysis of medical images. This has several applications, including the rapid diagnosis of large amounts of medical image data, thus helping doctors and clinicians perform faster and more accurate diagnosis. Microscopy analysis are an important modality in modern medicine, useful for diagnosing several diseases including malaria and cervical cancer. Seven speakers, including pathologists, physicists, and engineers gave lectures. Dr Sandeep R. Mathur, professor of pathology at the All India Institute of Medical Sciences, New Delhi delivered the keynote talk. Dr. Kedar Khare from the Department of Physics at IIT Delhi explained about a phase-microscope developed by his research group. Dr. Sarita Ahlawat, also from IIT Delhi, spoke about the efforts to commercialise the above microscope, and its application to the screening of cervical cancer. Dr Sai Subrahmanyam Gorthi from the Indian Institute of Space Science and Technology Thiruvananthapuram spoke about recent research in the use of deep learning in the analysis of microscopy images. Dr Vani Ravikumar, a pathologist from R.V. Metropolis, Bangalore, discussed various clinical aspects and how automation could be useful in diagnosis. Mr K.C. Bhushan from Aindra Systems, Bangalore spoke about the company's journey developing and commercialising automatic cervical cancer screening. Dr. Amod Anandkumar from Mathworks India, demonstarted the various tools available in the Matlab (TM) computing environment for machine learning on images. Other in-house speakers covered topics ranging from the basics of machine learning, hands-on sessions in machine learning, to

applications. The workshop was attended by 50 participants from all over India, including students, research scholars and faculty.

NCVPRIG 2017

3.   Offered courses for QEEE and IIIT Allahabad. The courses are "Design with Opamp" (in Oct'17) and "BJT/MOSFET Amplifiers" (in Feb'18). The course taught for IIIT is "High performance design of operational amplifiers" (in March'18).

4.   Conducted IoT session with hands on experience in STEP program for high school students from HP in June 2017.

5.   A workshop was organized by Construction Material Laboratory on Disaster management. In this workshop various geotechnical management techniques were discussed from the state government employees along with other experts working in this field. Different methods were introduced for mitigating landslides and other disasters by deforestation, human awareness, building gabion walls etc. and some monitoring techniques also introduced for alerting people. In this we presented our Low-cost MEMS based sensors for monitoring and alerting people about the impending landslide, so the uman as well as economy losses can be prevent.

6.   Presented low-cost MEMS based landslide monitoring system in Startup Himachal event

organized by the Himachal Pradesh Centre for Entrepreneurship Development to provide financial support to host institutions so that they are able to provide requisite hand holding and support to the potential entrepreneurs/startups having new ideas for serving people.

7. School has arranged Half day workshop on audio forensics for Regional Forensics Lab, Mandi.

8. Organised a Deep Learning (Theory + Tutorial) five-day workshop at AMU. Organised a full day tutorial at NCVPRIPG2017 on "Shallow to Deep Learning (Theory + Tutorial)".

9. From 17th-18th July 2017, SCEE hosted the Formal Methods Update Meeting 2017 at its campus in Kamand. This annual event of the Indian Association for Research in Computer Science (IARCS) brings together scientists and researcher from India working on formal methods in system design and verification. This year, 23 researchers from all over India (TCS Research, TIFR, CMI , IMSc, IISc, IIT Ghandinagar, IIT Hyderabad, Punjabi University Patiala and others) presented and discussed topical developments in their area. The event was supported by TCS and SCEE, the local organization committee comprised Dr. Astrid Kiehn and Dr. Samar Agnihotri.

10. Offered QEEE lectures delivered on specialized topics on control system engineering.

5. Conf./Workshops/Other Inst./Industry Visited (India or Abroad) or Invited Lectures Delivered

Dr. Shubhajit Roy Chaudhury

Conferences visited:

1. IEEE VLSI and Test Symposium, IIT Roorkee, June 30 to July 02, 2017.

2. European Sensors and Actuators Summit 2017, Stockholm, Sweden, August 22-24, 2017.

Invited talks delivered:

1. "Innovation in Point of Care Testing Medical Devices" at the Workshop on Innovation organized by Jawaharlal Nehru Government Engineering College, Sundernagar on March 14, 2018.

2. "Point of care testing of patients: Translating health care from hospital to home" at the International Telemedicine Workshop organized by CDAC Mohali on March 07, 2018.

3. "Neural Networks: A journey from biology to computing to biology" at the Centre for Green Energy and Sensing Systems, Indian Institute of Engineering, Science and Technology, Shibpur on January 30, 2018.

4. "Translating health care from hospital to home" at the TCS Innovation Labs, Kolkata on January 29, 2018.

5. "A low cost point of care testing hardware for stroke diagnosis" at the TCS Innovation Labs sponsored Indian Stroke Workshop, Bangalore on April 14-15, 2017.

6. "Non invasive diagnosis for patient care: From hospital to home" at Indraprastha Institute of Information Technology Delhi, India on April 06, 2017.

Dr. Satyajit Thakor

1. Conference visit:International Symposium on Information Theory (ISIT), Aachen, Germany.

2. Institute visit: Institutue for Telecommunications Research, University of South Australia, Australia.

Dr. Sriram Kailasam

Keynote Lecture on "Cloud-based framework for Smart Applications" delivered in National Conference on Smart Solutions for Research in Energy, Agriculture and Challenges in Health Informatics (SSREACH '18') 24Feb, 2018.

Dr. G Shrikanth Reddy (SCEE)

1. IEEE- International Conference on Antenna Innovations and Modern Technologies (iAIM-2017), Bangalore.

2. Industry visited: National Aerospace lab- Center for EM research, Bangalore.

Dr. Hitesh Shrimali

Visited TU Berlin from Jun-Aug 2017. As a part of the visit organized a BMBF funded workshop on "Current trends in analog circuit designing".

As a part of TU9-IIT Mandi exchange programme, IIT Mandi and TU-Berlin have organized a BMBF funded workshop on "Current Trends in Analog Circuit Designing" on september 25-26, 2017. The workshop was organized by Dr. Hitesh Shrimali of IIT Mandi and Prof. Friedel Gerfers of TU-Berlin.

The workshop included experts from semiconductor industries such as STMicroelectronics, Synopsys and Western Digital (Sandisk). Prof. Friedel Gerfers presented high performance, high precision, energy efficient sigma-delta data conversion techniques. Moreover, Prof. Friedel Gerfers has presented measurement results of his recent IEEE publication with his PhD student Marcel Runge. Dr. Jai Narayan Tripathi (Technical Leader, STMicroelectronics) has delivered a lecture on jitter measurement techniques. He has presented his recent publications with measurement results on CMOS and FD-SOI technologies. Mr. Tapas Nandi (Director, Synopsys pvt. ltd.) has delivered expert talk on high speed wireless communication links, keeping the focus on high speed transmission links, PLL, CDR and oscillator circuits. Mr. Nitin Gupta (Director, Western Digital) has presented the world of analog in high performance system on chips. Mr. Atul

Bhargava (Technical Staff Engineer, STMicroelectronics) has presented design methodologies for state of the art analog circuits.

The event was co-ordinated by student co-ordinators: Vijender Kumar Sharma, Kumar Sambhav Pandey, Sumit Kumar Pandey, Puneet Arora, Ashish Joshi, Dinesh Kumar B., Indu Yadav, Shivani Sharma, and Ankita Deo.

The detailed workshop activities can be found on the following link:

http://iitmandi.ac.in/workshops/CTACD/

Dr. Ankush Bag

International Workshop on Physics of Semiconductors (IWPSD 2017), IIT Delhi.

Dr. Srikant Srinivasan

Invited lecture at IHBT Palampur on May 17on IoT for agriculture (Photo attached) Invited Lecture at Globalfoundries Bangalore on Spin electronics.

Rahul Shrestha

Visited Taiwan to present my research paper in VLSI-DAT Conference during April 2017.

Dr. Varun Dutt

1. Dr. Varun Dutt presented his work on Interactive Landslide Simulator at London South Bank University, United Kingdom, in June, 2017.

2. Dr. Varun Dutt presented at the 2017 DST ICPS workshop at IIT Kanpur on October 21st, 2017.

3. Dr. Varun Dutt presented at the 2018 DST ICPS workshop at IIT Delhi on March 13th, 2018.

4. Dr. Varun Dutt presented at the SDMA workshop on Rainfall Induced Landslides: Mapping, Mitigations and Monitoring on 11th October, 2017 at IIT Mandi.

5. Dr. Varun Dutt presented a lecture on cognitive modeling at the QIP-CEP Workshop on Experimental & Empirical Methods in Linguistics, 9th July - 15th July 2017, at IIT Delhi.

Dr. Padmanabhan Rajan

Paper presented at MLSP 2017, Tokyo, Japan.

Dr. Arnav Bhavsar

1.   National conference on computer vision, pattern recognition, image processing, graphics m (NCVPRIPG 2017) (Dec 2017).

2.   Workshop on Machine learning for Medical Image Analysis (WMLMIA 2017) (June 2017).

Dr. Aditya Nigam

Delivered an expert lecture at NITTTR Kolkatta. Delivered an expert lecture at IIT BHU.

Dr. Astrid Kiehn

Guest speaker at "A National Workshop on Reliability and Economic Performance of Multi-functional Microgrids for Indian Scenario", December 21-23, 2017, IIT Mandi, India.

Tushar Jain

Guest speaker at "A National Workshop on Reliability and Economic Performance of Multi-functional Microgrids for Indian Scenario", December 21-23, 2017, IIT Mandi, India.

6.   Eminent Guest/Scholars/Students/Interns Hosted: (With details of activities/talks etc.)

1.   Invited Lecture by Dr. Shiv Narayan Senior Scientist, CSIR-National Aerospace Lab, Bangalore Title of Talk: Frequency Selective surface and its application in Aerospace industry.

2.   The speakers were called as a part of BMBF funded workshop. They were Prof. Friedel Gerfers from TU Berlin, Mr. Tapas Nandy (Director, Synopsys pvt. ltd.), Mr. Nitin Gupta (Director, Western Digital), Dr. Jai Narayan Tripathi (Technical Lead, STMicroelectronics pvt. ltd.) and Atul Bhargava (Technical Lead, STMicroelectronics pvt. ltd.).

3.   Invited Lecture by Dr. Marieke van Vugt (University of Groningen) on title Chasing cognitive mechanisms associated with oscillatory synchronization with computational models.

NIT Jalandhar Visitors

Purpose: Research Collaboration meeting

Date of Visit: 13-16 September, 2017

An interaction meeting between faculty and research scholars from NIT Jalandhar, and from IIT Mandi was held on Sep 15, 2017.The objective of the meeting was to explore the possibility of researchcollaboration in the areas of signal and image processing. Suggested areas of collaboration include:

●   Machine learning and its applications

●   Deep learning and its applications in computer vision

●   Deep learning and its applications in biometrics

●   Image processing

Prof. M. Manivannan

Purpose: Talk and Seminar

Date of visit: 26 October, 2017

He is from the Department of Applied Mechanics, IIT Madras visited IIT Mandi from September 26-October 01, 2017. Prof. Manivannan delivered a talk on "Modern Health Monitoring Tools from Ayurveda".

Dr. Shiv Narayan

Purpose: Teaching and Seminar

Date of Visit: 10-13 October, 2017

- Lecture and Interactive session by Dr. Shiv Narayan, Sr. Scientist, National Aerospace Lab (NAL-CSIR) Bangalore.

- 11th Oct. 2017: Received Dr Shiv Narayan by evening. Informal discussion about IIT Mandi-infrastructural and academic development.

- 12th Oct. 2017: Lecture on "Fundamentals of Frequency selective surfaces".

Prof. Milind D Atrey

Purpose: Teaching and Seminar

Date of Visit: 16-22 May, 2017

- He is Professor in charge of the Refrigeration and Cryogenics Laboratory in the Department of Mechanical Engineering, IIT Bombay.

- Prof Milind Atrey visited IIT Mandi to interact with the faculty and students of SCEE to discuss areas of collaboration and stimulate new research directions. .

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Prof. Yvonne Dittrich

Purpose: Teaching and Seminar

Date of Visit: 11-18 November, 2017

• IEEE Seminar on The Indian Stack and Financial Inclusion - What is in there for research? The Indian Stack and Financial Inclusion – What is in there for research?

• I would like to present some of the learnings from a recent trip to Bangalore and Mumbai and discuss the need for research supporting the current development around digital payments. I will take up Software Engineering, Artificial Intelligence, and Security.

Robert Bosch Visitors

Dr. Jonathan Neudorfer, Dr. Farhad Amirali Merchant, Dr. Birupaksha Pal, Dr. Kaustav Niyogi

IEEE Industry Inteaction: Real time simulation at Robert Bosch Research and Technology Centre India

Purpose: Talk and Seminar

Date of Visit: 08-09 November, 2017

An interactive talk with a team from Robert Bosch Research and Technology Center, Bangalore has been schduled by IIT Mandi, IEEE PES-IAS Chapter and IEEE PELS-IES as per the following program:

Title of the talk: **Real time simulation at Robert Bosch Research Centre India**

Prof. B Yegnanarayana

IEEE PES-IAS Lecture on Evolution of ANN, architectures: From learning to deep learning

Purpose: Teaching and Seminar

Date of Visit: 25 October, 2017

Title: Evolution of ANN, architectures: From learning to deep learning

Prof. Ravindra Arora, IIT Kanpur

Purpose: Teaching and Seminar

Date of Visit: 8 December, 2017

IEEE PES-IAS Talk on Introduction to High Voltage Engineering and Lightning Phenomenon

A Technical Talk being organized by IEEE PES-IAS and PELS-IES Delhi Section as per following details:

Topic: Introduction to High Voltage Engineering and Lightning Phenomenon

Dr. N.M. Pindoriya IIT Gandhinagar

Purpose: Talk and Seminar

Date of Visit: 09-10 June, 2017

IEEE PES-IAS and PELS-IES Technical Seminar on Integrating Distributed Renewables and Energy Storage in Distribution Network

IEEE PES-IAS and PELS-IES Technical Seminar on Smart Grid Developments in India: Path towards efficient and environmentally sustainable electricity access

Topic: Smart Grid Developments in India: Path towards efficient and environmentally sustainable electricity access

Dr. Mahima Arrawatia, IIT Guwahati

Workshop/Product demo lecture: Keysight Technologies and Cascade Technologies

Title of Talk: Measurements and testing related to Communication, Semiconductor devices, and IoT application.

Dr. Marieke van Vugt (University of Groningen)

Purpose: Teaching and Seminar

Date: 02-04 September, 2017

Title: Chasing cognitive mechanisms associated with oscillatory synchronization with computational models

Prof. S. N. Singh, IIT Kanpur

Purpose: Talk and Seminar

Date of Visit: 09-10 June, 2017

IEEE PES-IAS and PELS-IES Technical Seminar on Role of Forecasting in Power System OperationTopic: Role of Forecasting in Power System Operation

IEEE PES-IAS and PELS-IES Technical Seminar on Smart Multi-Terminal DC Âμ-Grid Control and Operation

Topic: Smart Multi-Terminal DC μ-Grid Control and Operation

Prof. K.N. Srivasatava

Purpose: Teaching and Seminar

Date of Visit: 13 February, 2017 for a period of 1 semester

IEEE PES-IAS and PELS-IES Technical Seminar on Future Power Systems: Adapting to Future ChallengesTopic: Future Power Systems: Adapting to Future Challenges?

Presentation Date: June 8, 2017
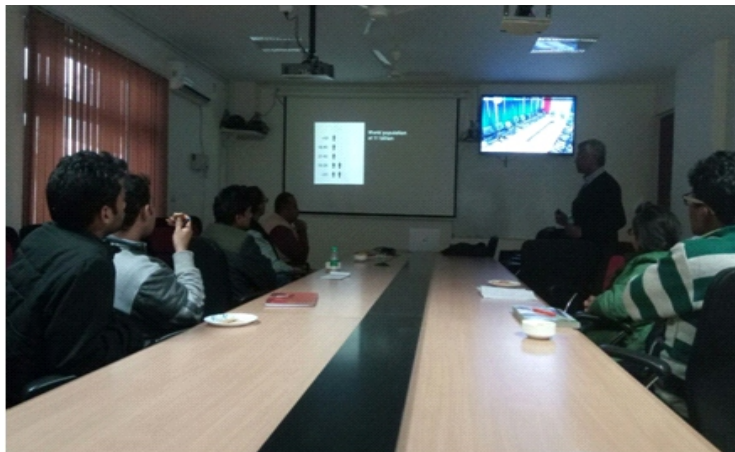

Prof. K.N. Srivasatava

Purpose: Teaching and Seminar

Date of Visit: 13 February, 2017 for a period of 1 semester

IEEE PES-IAS Talk: Why presentations matter?

Topic: Why presentations matter?

Presentation Date: 17 May, 2017

Mr. B. R. Bharath

Purpose: Talk and Seminar

Date of Visit:

Topic: Product manufacturing of power distribution equipment at various voltage levels, application

engineering for projects and general discussions in related area.

7.   Professional achievements, honors and awards/ Membership of Professional Societies

Dr. Shubhajit Roy Chaudhuri

1.   Selected as Associate Editor of IEEE Access Journal by IEEE in the year 2018.

2.   Elected as a member of Award Committee for Gandhian Young Technological Innovation (GYTI) Award by the Society for Research and Initiatives for Sustainable Technologies and Institutions (SRISTI) in the area of Health Care devices in the year 2018.

3.   Received IAAM Scientist Medal in the European Sensors and Actuators Summit 2017 at Stockholm, Sweden.

Dr. G Shrikanth Reddy (SCEE)

Best paper award (Session T-7) IEEE- International Conference on Antenna Innovations and

Modern Technologies (iAIM-2017), Bangalore.

Dr. Hitesh Shrimali

1.   Distinguished Alumni Award 2017 (Instrumentation and Control Engg. Department, Nirma University)

2.   All-Rounder Contribution Award for the Execution of Academic and Research Activities at IIT Mandi (2017);

3.   IEEE professional member and IEEE societies member for NPS, CAS, IES and SSCS.

Dr. Srikant Srinivasan

•   Awarded Ramalingaswami Re-Entry fellowship in Dec. 2017Membership of IEEE and ACM.

Dr. Varun Dutt

1.   Appointed to the Board of Governors of RxDataScience, USA in January, 2018.

2.   IEEE Senior Membership, 2017.

3.   Committee Member for the creation of Centre for Landslide Research, Studies and Management (CLRSM), 2017.

8.   New initiatives/New Research facilities created/equipment installed/ laboratory established.

Dr. Shubhajit Roy Chowdhury

1. Developed double sided dry PCB fabrication facility at IIT Mandi at the Design and Innovation Centre.

2. Developed a Tinkering Lab for students at the Design and Innovation Centre.

Dr. Satyajit Thakor

Mathematica software is procured from external project fund for research.

Dr. G Shrikanth Reddy (SCEE)

VNA, Portable Anechoic chamber, Far-field/Near field radiation measurement facility, Material characterization facility.

Dr. Hitesh Shrimali

1. Setup the VLSI design laboratory as a part of Special Man-power Development project from chip to system design (SMDP-C2SD), funded by DeitY. The laboratory is equipped with all the industry standard chip-designing tools such as Cadence, MentorGraphics, Synopsis research suite and the Spartan FPGA boards.

2. The laboratory has cutting edge process design kit (PDK) technologies ranging from 28 nm to 180 nm CMOS technologies. The PDKs have been acquired from the Europractice by signing required NDAs. The Europractice is a consortium of IMEC Belgium, STFC UK and Fraunhofer IIS Germany. These technologies are being used to teach various subjects to UG and PG students.

Dr. Srikant Srinivasan

Initiative on setting up an interdisciplinary IoT lab at IIT Mandi campus. Currently operating from spaces.

Dr. Varun Dutt

Workstation installed in Applied Cognitive Sciences Lab: 32 GB Intel core i5 (2.8 GHz) with Geforce GTX 1080Ti (12 GB memory), Ubuntu

Dr. Arnav Bhavsar

Purchased 2 Drones and 2 depth cameras for the MANAS lab

Dr. Aditya Nigam

From school funding, we have procured 6 GPU card. From Institute and School funding, we have procured 24 GPU nodes in HPC. From school funding, we have procured multiple sensors such as Iris scanner, 4-slap scanner, signature pad, drones, depth sensors.

Dr. Tushar Jain

1. Wind Turbine emulator - Wind turbine emulator mimics the behaviour of actual wind turbine under controlled manner. It provides a flexible testing flatform of dynamic and steady state behaviour of wind turbine. It is also coupled to the generator, other power electronics circuitry and grid. So, it is not needed to rely on environmental conditions which are appropriate for driving the wind turbine emulator at some desired operating point.

2. Three tank system - The Multitank System relates to liquid level control problems commonly occurring in industrial storage tanks. For example, steel producing companies around the world have repeatedly confirmed that substantial benefits are gained from accurate mould level control in continuous bloom casting. Mould level oscillations tend to stir foreign particles and flux powder into molten metal, resulting in surface defects in the final product. The goal of

the Multitank System design is to study and verify in practice linear and nonlinear control methods. The general objective of the control is to reach and stabilise the level in the tanks by an adjustment of the pump operation or/and valves settings.

Major items brought in SCEE labs.:

Sr. No.	Name of equipments	Quantities (No's)
1	Spartan 6 FPGA Kit (Xilinx)	1
2	NVIDIA JETSON TK1 development kit	1
3	NVIDIA JETSON TX2 SOM	1
4	Development kit (EIC-Q820-210)	1
5.	Digital Multimeter Model 17B+	1
6	Arbitrary Function Generator	17
7	IC Tetser (Analog)	1
8	IC Tester (Digital)	1
9	Digital Multimeter Model 115 Fluke	5
10	Digital Multimeter Model 17B+ Fluke	10
11	Desktop	1
12	LCR Meter	3
13	DC Power Supply (0-30V)/5A	2
14	DC Power Supply (0-25V)/7A,(0-50V)/4A	1
15	Mixed Domain Oscilloscope	1
16	Current Probes	3
17	Differential Probes	3
18	Desktop	14

9. Student Activities/Achievements:

- Student Ms. Yashika Arora selected for internship at Carnigie Mellon University, USA in the area of NIRS based neurodiagnosis.

- Abhishek Pandey won best MTP thesis award for "Design and Implementation of a Scalable Complex Event Processing Framework".

- Ayush Kumar Yadav won best MTP thesis award for "Evaluating Data Models for Astronomical Data".

- Deepanshu Sapra and Deepanshu Gupta won runner-up MTP thesis award for "A distributed framework for real-time computation of formal concepts and concept lattice.

- Dr. Debarati Banerjee, postdoctoral fellow, SCEE, IIT Mandi was selected for APMI-MPIB-SOTON Winter School on Bounded Rationality 2018 to be held in collaboration with the Max Planck Institute for Human Development, Germany..

- Ms. Palvi Aggarwal, Ph.D. candidate, SCEE, IIT Mandi, got a postdoctoral fellowship offer from Carnegie Mellon University, USA.

- Mr. Zahid Maqbool Ph.D. candidate, SCEE, IIT Mandi, became an Assistant Professor in

Dooru College, Government of Jammu and Kashmir.

- Ms. Shruti Kaushik Ph.D. candidate, SCEE, IIT Mandi, was selected to attend the 1st Data Science Summer school held at Ecole Polytechnique, Paris, France.

- Mr. Akash Rao Ph.D. candidate, SCEE, IIT Mandi won the best poster award in Anushandhan (Annual IIT Mandi Research fair) 2018 in IIT Mandi.

- Ph.D. student, Mrs. Avantika Singh got her research work accepted for the presentation in WiCV@CVPR2018 at Utah USA and have got full funding.

- Vyoma Singh carried out an internship on the topic "Online Calibration" at Robert Bosch Engineering and Business Solutions Private Limited, Bangalore from September 4, 2017 to November 28, 2017.

- Mona Subramaniam A, Vyoma Singh and Avinash Kumar received travel grant from EECI to attend this workshop : European Embedded Control Institute (EECI) -IGSC (M08 – MADRAS(India) 13/03/2017-16/03/2017 Nonlinear Model Predictive Control Frank Allgöwer & Matthias A. Müller, University of Stuttgart, Germany).

- **Mr. Dauood Saleem** Attended a GIAN course by Gerhard Kramer, who is Alexander von Humboldt Pro-fessor and Chair of Communications Engineering at the Technical University of Munich(TUM) Germany on "Network Information Theory" at Indian Institute of Technology Kanpur (IIT Kanpur), March 15-24, 2018.

- Presentation on research work titled, "Classification of HEp-2 Whole Slides Images for Autoimmune Disorder Detection" in BioX research fair, IIT Mandi, held on 11th June 2018.

Ms. Krati Gupta presented her work in CoDS-COMAD 2018 and SPIE-MI 2018 at Texas, USA

10. Media Coverage in Newspapers and TV/ Important Photographs/albums:

Dr. Shubhajit Roy Chowdhury

The news on MIT IIT Bootcamp was coevered in the Tribune.

Dr. Hitesh Shrimali

The Aavishkar event got local media coverage in various Himachali newspapers.

Dr. Varun Dutt

Articles published in newspapers.

Newspaper: Amar Ujala Dated: March 26, 2018   Another newspaper cutting

11. Any other information which may be included in the Annual Report:

Visit from School Children's

A group of students from Govt. Sen. Secondary School Pandoh Distt Mandi. visited our labs on 29 January ,2018 .We have shown them all basic instruments using in our lab.

A group of students from SAI university visited our Labs . The students were from B.Tech 2nd year Electrical and electronics discipline.It was also collaborated with IEEE.

- A group of students from Govt. Sen. Secondary School Pandoh Distt. Mandi visited **Control System Lab** on 29 January, 2018 .We have shown them all basic equipment such as Robotic Arm, Self balancing Robot etc.

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- Around thirty five students and three faculty members had visited from Bachelor of Technology in Electrical, Electronics department of Sri Sai University, Palampur, Himachal Pradesh, on 26th March, 2018. We have shown them all the equipment's of control system lab and basic of LabView software.