INDIAN INSTITUTE OF TECHNOLOGY MANDI

Kamand– 175075, Himachal Pradesh, India

ANNUAL REPORT 2019-20

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INDIAN INSTITUTE OF TECHNOLOGY MANDI
Kamand – 175075, Himachal Pradesh, India

VISION

To be a leader in science and technology education, knowledge creation and innovation, in an India marching towards a just, inclusive and sustainable society.

MISSION

- To create knowledge through team effort and individually for the benefit of society.
- To impart education to produce professionals capable of leading efforts towards innovative products and processes for the development of the Himalayan region in particular and our country and humanity in general.
- To inculcate a spirit of entrepreneurship and to impart the ability to devise globally recognized solutions for the problems of society and industry, particularly in the fragile eco-system of the Himalayas.
- To train teachers capable of inspiring the next generation of engineers, scientists and researchers.
- To work intensely with industry in pursuit of the above goals of education and research, leading to the development of cutting edge and commercially-viable technologies.
- To operate in an ambience marked by overriding respect for ability and merit.

CONTENTS

From the Director's Desk

IIT Mandi began its journey in 2009 to achieve global renown in research and education. Since 2009, the Institute has progressed rapidly. Presently, there are about 1650 students studying in various disciplines of Engineering, Sciences, Humanities and Social Sciences. The Institute is untiringly working to impart quality education both in engineering and science that keeps pace with the latest advances in research and development activities.

In 2019-20, we started 3 new B.Tech programmes: B.Tech. in Data Science and Engineering, B.Tech in Engineering Physics and notably, B.Tech/M.Tech Integrated Dual Degree in Bio-Engineering. The year 2019 saw an increase of 72 students. Our faculty and research scholars won several awards including Infosys Prize in Humanities, membership of the Indian National Young Academy of Sciences, Young Scientist Award, JSPS Fellowship and several best paper awards in international conferences. Also, IIT Mandi was the leader in 2019 with 21% females in 1st B.Tech.

During 2019-20, the Institute saw rapid expansion with many buildings being completed in the South and North Campus which includes classrooms, hostels, faculty/staff housing and sports facilities. Presently, both the campuses (North and South Campus) are fully functional.

Since 2011, IIT Mandi has forged a strong partnership with the TU9 in Germany. This involved significant mobility of faculty and students and joint research. There was a significant increase in outreach activities benefiting the people of Himachal Pradesh which includes sponsored projects by the HP Government and IIT Mandi.

In April 2019, IIT Mandi hosted an International Workshop on Climate Change and Extreme Events in the Himalayan region, scientists from throughout the globe discussed on climate change and extreme events. Renowned US geophysicist Prof. Roger Bilham, University of Colorado Boulder, U.S., delivered a video lecture on 'Future great earthquakes in the Himalaya'. From June 17th to 19th, we hosted the International Conference on Differential Equations and Control Problems: Modeling, Analysis and Computations. Around 240 persons participated in the event. Keynotes lectures were delivered by eminent mathematicians from India and abroad. The workshop on Hydrus software package with HP! and phreeqc module was organized from 9th to 11th Sept 2019, this event featured over a dozen eminent speakers.

On 24th February, IIT Mandi celebrated its 11th Annual Foundation Day and on 5th October, our 7th Convocation was held in the Institute Auditorium. The graduands were inspired by the speeches of Shri Baba Neelkanth Kalyani, Padma Bhushan, Chairman and Managing Director, Bharat Forge Ltd., Chief Guest and Shri Subodh Bhargava, Chairperson, Board of Governors, IIT Mandi & Former Chairman, TATA Communications Limited.

In December 2019, our contingent won 3 medals in the Inter-IIT Sports Meet held at IIT Kharaghpur. In 2019-20, our Green Committee led the 1st year B.Tech. students in planting 900 saplings in the North Campus. Both campuses saw 35,400 new shrubs planted.

The faculty, students and staff of IIT Mandi worked hard during 2019-20 on the challenge of making IIT Mandi a preferred destination for high-quality learning, research and innovation. Their new initiatives during the year will surely bear rich fruits during the years to come.

Prof. Ajit K. Chaturvedi
Director

1. Academic Structure

Academic activities including Teaching, Learning and Research are carried out in three orthogonal but complementary structures. These are Academic Schools, Student Degree Programmes and Research Groups. Each of these is designed to serve a distinct purpose. The three interact in flexible ways to best achieve the academic goals of the Institute. The structure encourages inter-disciplinary learning and research that evolves in step with the march of technological innovation.

1.1 Schools

Faculty members belong to broadly and loosely defined Academic Schools. Each School provides a home base for faculty whose interests share some fundamental academic principles. Some faculty members also have joint appointments in other Schools. By broadly grouping faculty members into Schools, IIT Mandi has avoided traditional departments and divisions within the Institute. This has been done with a view to actively foster an interdisciplinary culture and collaborative research and projects across disciplines within the Institute.

Currently, the Schools in the Institute are:

School of Computing and Electrical Engineering (SCEE)

Faculty members in the broad areas of Computer Science, Computer Engineering, Electrical Engineering including Electronics and Semiconductors, Signal Processing, Automation and Control and Electrical Energy Systems are part of this School.

School of Engineering (SE)

Faculty members from other areas of Engineering including Mechanical Engineering and Civil Engineering, Material Science are part of this School.

School of Basic Sciences (SBS)

Faculty members from all areas of basic sciences, including Physics, Mathematics, Chemistry and Biology are part of this School.

School of Humanities and Social Sciences (SHSS)

Faculty members from English, German studies, Economics, Sociology, Psychology, Management, History and other areas of Humanities and Social Sciences are part of this School.

1.2 Degree Programmes

1. Bachelor of Technology (B.Tech) in the following engineering disciplines
   a) Civil Engineering (CE)
   b) Computer Science & Engineering (CSE)
   c) Data Science and Engineering (DSE)
   d) Electrical Engineering (EE)
   e) Engineering Physics (EP)
   f) Mechanical Engineering (ME)
   g) B.Tech.-M.Tech. Integrated Dual Degree in Bio-Engineering
2. M.S. (by Research) in the following engineering disciplines
   a) Computer Science and Engineering

b) Mechanical Engineering
c) Electrical Engineering

3. Ph.D. in Engineering, Basic Sciences and Humanities & Social Sciences
4. M.Sc. in Chemistry
5. M.Sc. in Applied Mathematics
6. M.Sc. in Physics
7. M.Tech in Mechanical Engineering with Specialization in Energy Systems
8. M.Tech in Energy Engineering with Specialization in Materials
9. M.Tech. in Structural Engineering
10. M.Tech in VLSI
11. M.Tech. in Power Electronics and Drives
12. M.Tech. in Communications and Signal Processing
13. M.Tech in Biotechnology
14. I-Ph.D. (Physics)
15. Master of Arts in Development Studies

1.3 Statistics of the currently enrolled students based on the Year of Enrollment, Batch, Gender and Category.

Gender wise data		
Year	**Male**	**Female**
2012	3	0
2013	3	1
2014	17	10
2015	38	21
2016	197	31
2017	184	42
2018	360	103
2019	484	151
Total	**1286**	**359**

	B.Tech						M.Sc.(Chemistry/Maths/Physics)						M.Tech					
Year	**Gen**	**OBC**	**SC**	**ST**	**EWS**	**Total**	**Gen**	**OBC**	**SC**	**ST**	**EWS**	**Total**	**Gen**	**OBC**	**SC**	**ST**	**EWS**	**Total**
2014	1	0	0	0	0	1	--	--	--	--	--	--	--	--	--	--	--	--
2015	0	1	2	0	0	3	--	--	--	--	--	--	--	--	--	--	--	--
2016	73	40	23	11	--	147	--	--	--	--	--	--	--	--	--	--	--	--
2017	73	39	23	11	--	146	1	1	0	0	0	2	0	1	0	0	0	1
2018	94	53	29	15	--	191	36	27	12	3	--	78	66	24	6	2	0	98
2019	126	72	41	17	6	262	46	28	16	6	4	100	87	38	17	3	9	154
GRAND TOTAL						**750**						**180**						**253**

	M.A.						I-Ph.D.						M.S. (by Research)					
Year	**Gen**	**OBC**	**SC**	**ST**	**EWS**	**Total**	**Gen**	**OBC**	**SC**	**ST**	**EWS**	**Total**	**Gen**	**OBC**	**SC**	**ST**	**EWS**	**Total**
2015	--	--	--	--	--	--	4	1	0	0	0	5	1	0	0	0	0	1
2016	--	--	--	--	--	--	4	0	0	0	0	4	4	0	0	0	0	4
2017	--	--	--	--	--	--	4	2	0	0	0	6	7	2	1	0	0	10
2018	8	2	2	0	0	12	0	0	0	0	0	0	19	2	0	0	0	21
2019	6	2	2	0	2	12	2	1	0	0	0	3	23	5	0	0	0	28
GRAND TOTAL						**24**						**18**						**64**

	Ph.D.						Part-Time/ERP (M.S./Ph.D.)					
Year	**Gen**	**OBC**	**SC**	**ST**	**EWS**	**Total**	**Gen**	**OBC**	**SC**	**ST**	**EWS**	**Total**
2012	2	1	0	0	0	**3**	0	0	0	0	0	**0**
2013	1	0	0	0	0	**1**	3	0	0	0	0	**3**
2014	16	4	0	0	0	**20**	4	2	0	0	0	**6**
2015	34	9	2	0	0	**45**	4	1	0	0	0	**5**
2016	51	13	7	0	0	**71**	1	1	0	0	0	2
2017	43	11	4	0	0	**58**	2	0	1	0	0	3
2018	50	5	4	0	0	**59**	3	1	0	0	0	4
2019	46	18	3	2	0	**69**	7	0	0	0		7
GRAND TOTAL						**326**						**30**

EXTERNALLY SPORNSORED RESEARCH PROJECTS

S. No.	Project No.	Project Title	Sponsoring Agency	Principal Investigator & Co-ordinator(s)	Department/ School	Amount Sanctioned (in Rs.)	Duration of Project
1	IITM/DST-ICPS/GSR/241	Design of IoT trans-receiver integrated with compact MIMO/ Diversity antenna scheme	DST-ICPS	Dr. Gopi Shrikanth and Dr. Mahima Arrawatia (Co-PI), IIT Jodhpur	School of Computing & Electrical Engineering	17,00,880	3 years
2	IITM/DST-ICPS/RSh/242	High- throughput & energy- efficient flexible- turbo / LDPC decoder for the next generation wireless communication system	DST-ICPS	Dr. Rahul Shrestha	School of Computing & Electrical Engineering	38,82,960	3 years
3	IITM/DIC-YFRF/HS/243	VLSI Chip designing research - Young Faculty Research Fellowship (YFRF)	DIC-YFRF	Dr. Hitesh Shrimali	School of Computing & Electrical Engineering	14,80,000	2 years
4	IITM/DIC-YFRF/ASO/244	Young Faculty Research Fellowship (YFRF)	DIC-YFRF	Dr. Anil Kumar Sao	School of Computing & Electrical Engineering	14,80,000	2 years
5	IITM/SERB/NRT/245	Next generation dynamic capacitive and inductive power transfer topologies in green e-transportation systems	SERB	Dr. Tummuru Narsa Reddy	School of Computing & Electrical Engineering	41,43,832	3 years
6	IITM/SERB-MATRICS/NKU/246	Modeling and control of the hinglish invasion in India: A mathematical study	SERB	Dr. Nitu Kumari	School of Basic Sciences	6,60,000	3 years
7	IITM/SERB/KV/247	Development of rainfall intensity duration frequency (IDF) curve over India under non-stationary climatic conditions	SERB	Dr. Kasiviswanathan KS	School of Engineering	21,98,000	3 years
8	IITM/SERB/MM/248	Rate- dependent behavior of sand and its implications on strength prediction from field penetration tests	SERB	Dr. Mousumi Mukherjee	School of Engineering	29,35,180	3 years
9	IITM/DRDO/SJ/249	Development of carbon fiber reinforced polymer composites using microwave curing	DRDO	Dr. Sunny Zafar , Dr. Himanshu Pathak (Co-PI)	School of Engineering	15,25,800	2 years
10	IITM/DRDO/SUS/250	Development of damage technique for composite laminated structures under varying temprature	DRDO	Dr. Subhamoy Sen , Dr. Rajneesh Sharma (Co-PI)	School of Engineering	23,39,000	2 years

11	IITM/DST-ICPS/VD/251	A game theoretic approach innolving experimentation and computational modelling of hacker's decision using deception in cyber security	DST-ICPS	Dr. Varun Dutt	School of Computing & Electrical Engineering	31,57,200	3 years
12	IITM/DRDO/HP/252	Design analysis of adhesively bonded composite patch repair of cracked aluminum aircraft panels	DRDO	Dr. Himanshu Pathak, Dr. Somnath Bhattacharya (Co-PI) (NIT Raipur)	School of Engineering	14,34,000	2 years
13	IITM/DST-JSPS/VB/253	Engineering photoluminescence of tungsten sulfide through doping and electrical biasing	DST-JSPS	Dr. Viswanath Balakrishnan and Prof. Yoko Sato (Kyushu University, Japan)	School of Engineering	9,30,000	2 years
14	IITM/NMHS/JKR/254	Jal Abhyaranya Campaign for water security in IHR	NMHS	Dr. Jaspreet Kaur Randhawa	School of Engineering	20,84,210	45 days
15	IITM/MHRD-SPARC/AB/255	Technology development of compound semiconductor devices for optoelectronic and electronic applications	MHRD-SPARC	Dr. Ankush Bag and Dr. Kunal Ghosh (Co-PI) from IIT Mandi, and collaboration with Prof. Jen-Inn Chyi (PI) and Dr. Kun-Yu Lai (Co-PI) from National Central University, Taiwan	School of Computing & Electrical Engineering	49,58,775	2 years
16	IITM/MHRD-SPARC/GB/256	Computation modelling of polydisperse multiphase bioreactor system for wastewater treatment	MHRD-SPARC	Dr. Gaurav Bhutani and Prof. Ajit Annachhatre (Co-PI) from IIT Mandi, and collaboration with Dr. Pablo Brito- Parada (PI) and Prof. Stephen Neethling (Co-PI) from Imperial College London	School of Engineering	44,36,195	2 years
17	IITM/MHRD-SPARC/AH/257	Advancing the fundamentals of electrocatalysis with the use of earth abundant materials for future of energy and transportation	MHRD-SPARC	Dr. Aditi Halder and Dr. Viswanath Balakrishnan (Co-PI) from IIT Mandi, and collaboration with Prof. Sanjeev Mukherjee (PI) and Prof. Joshua Gallaway (Co-PI) from Northeastern University, Boston, USA	School of Basic Sciences and School of Engineering	49,78,775	2 years
18	IITM/MHRD-SPARC/SKM/258	Developing novel strategies to capture Phytopathogen-agricultural host metabolic crosstalk by cell type specific 13 C metabolic phenotyping	MHRD-SPARC	Dr. Shyam Kumar Masakapalli as Principal Investigator (PI), Prof. Suvendra Kumar Ray and Dr. Siddhartha Sankar Satapathy (Co-PI's) from Tezpur University, and collaboration with Prof. George Ratcliffe (PI) and Prof. Nicholas Kruger (Co-PI) from University of Oxford, UK	School of Basic Sciences	46,81,775	2 years

19	IITM/MHRD - SPARC/RT/ 259	Area deprivation and the prevalence of non-communicable diseases: Analysis at the block level in Punjab	MHRD-SPARC	Dr. Ramna Thakur and Dr. Rajeshwari Dutt & Dr. Chander Singh (Co-PI's) from IIT Mandi, and collaboration with Prof. Martin Siegel (PI) from Technische Universitat Berlin and Dr. Warner Maier (Co-PI) from Helmholtz-Zentrum Munich	School of Humanities & Social Sciences	60,88,190	2 years
20	IITM/MHRD - SPARC/PF S/260	Developing conducting polymer nanostructures and their nanocomposites as visible light photocatalysts for environmental remediation using flow chemistry	MHRD-SPARC	Dr. Prem Felix Siril and Dr. Suman Kalyan Pal (Co-PI) from IIT Mandi, and collaboration with Prof. Samy Remita (PI) from Universite Paris-SUD and Dr. Chouki Zerrouki and Dr. Najla Fourati (Co-PI's) from Conservatoire National des Art et Maitiers de Paris	School of Basic Sciences	60,83,710	2 years
21	IITM/MHRD - SPARC/RG /261	Biophysics of Zika virus envelope protein, membrane fusion and inhibitor discovery	MHRD-SPARC	Dr. Rajanish Giri and Dr. Sanjeev Kumar Singh (Co-PI) from Alagappa University, and collaboration with Prof. Indira U. Mysorekar (PI) from Washington University in ST. Louis and Dr. Vladmir N Uversky (Co-PI) from University of Florida	School of Basic Sciences	97,23,515	2 years
22	IITM/MHRD - SPARC/SK/ 262	Distributed algorithms for formal concept analysis	MHRD-SPARC	Dr. Sriram Kailsam and Dr. Astrid Kiehn (Co-PI) from IIT Mandi, and collaboration with Dr. Sergie Obiedkov (PI) and Dr. Aleksey Buzmakov (Co-PI) from National Research University-Higher School of Economics (HSE), Russia	School of Computing & Electrical Engineering	42,59,040	2 years
23	IIT/DST/RR K/263	Metal organic material (MOM) embedded electrospun carbon nanofiber (CNF)	DST	Dr. Rik Rani Koner	School of Engineering	51,68,422	3 years
24	IITM/ICSSR /SSG/264	A study of the intersections of oral history and religon for sustainable development in the fragile himalayas located in Himachal Pradesh	ICSSR	Dr. Suman Sigroha	School of Humanities & Social Sciences	5,00,000	2 years
25	IITM/DST-INSPIRE/A KS/265	Modeling, Analysis,Design and control of a high frequency DC-DC converter for internet of things applications	DST	Dr. Amit Kumar Singha	School of Computing & Electrical Engineering	35,00,000	5 years
26	IITM/NMHS /PR/266	Multimodal Bird Analytics	NMHS	Dr. Padmanabhan Rajan	School of Computing & Electrical Engineering	34,36,200	2 years

27	IITM/DRDO /PR/267	Classification of sonar signals using deep convolution neutral networks	DRDO	Dr. Padmanabhan Rajan, Dr. Dileep A.D (Co-PI)	School of Computing & Electrical Engineering	16,46,800	2 years
28	IITM/CSIR/ VSC/268	Photocatalytic active transparent glass ceramics for waste water treatment	CSIR	Dr. Vishal Singh Chauhan	School of Engineering	21,16,000	3 years
29	IITM/NIRD& PR/RT/269	Documentation of successful case studies of initiatives for water conservation under MGNREGS	NIRD&PR	Dr. Ramna Thakur	School of Humanities & Social Sciences	2,49,700	2 months
30	IITM/DST-INT/BSR/270	Advanced coordinated control and protection of intelligent DC microgrids	DST	Dr. Bharat Singh Rajpurohit and Dr. Dimitar Bogdanov (Technical University of Sofia, Bulgaria	School of Computing & Electrical Engineering	11,82,350	2 years
31	IITM/CSIR/ RV/271	Solar Light driven waste water remediation using graphene ferroelectric composites	CSIR	Dr. Rahul Vaish	School of Engineering	20,66,000	3 years
32	IITM/DRDO /PFS/272	Micronization and Encapsulation of explosive by expansion of CO2-expanded liquid solutions	DRDO	Dr. Prem Felix Siril and Dr. Sameer Dalvi, IIT Gandinagar	School of Basic Sciences	22,64,850	3 years
33	IITM/SERB/ PKU/273	Investigations of chugging phenomenin in direct contact condensation towards mitigation of the pressure amplitude and oscillations	SERB	Dr. Parmod Kumar	School of Engineering	30,87,650	2 years
34	IITM/MHRD - SPARC/RRK/274	Engineering Nobel nanocomposite for enegy storage and conversion	MHRD-SPARC	Dr. Rik Rani Koner and Dr. Sumit Sinha Ray (Co-PI) from IIT Mandi, Dr. David Eisenberg (PI) and Dr. Charles E. Diesendruck (Co-PI) from Technion Israel Institute of Technology	School of Engineering	47,68,775	2 years
35	IITM/DST-INSPIRE/ABP/275	Design & synthesis of Cp* based half sandwich complexes of first row transition metals for sp2 and sp3 C-H activation	DST-INSPIRE	Dr. Amit B Pawar	School of Basic Sciences	10,07,703	5 years
36	IITM/SERB-NPDF/ASU/276	Visual scene understanding	SERB-NPDF	Dr. Amit Satish Unde (PI) and Dr. Renu M Rameshari (Mentor)	School of Computing & Electrical Engineering	19,20,000	2 years
37	IITM/CSIR/ ACY/277	Electron solvation by a layer of polar adsorbates realstic model	CSIR	Dr. Aniruddha Chakraborty	School of Basic Sciences	4,32,000	3 years
38	IITM/DST/SDG/278	Vulnerability profiles for India: State and district level	DST	Dr. Shyamasree Dasgupta	School of Humanities & Social Sciences	80,51,832	6 moths
39	IITM/DST-INSPIRE/GA/279	Designing functional nanomaterials for drug delivery	DST-INSPIRE	Dr. Garima Agrawal	School of Basic Sciences	35,00,000	5 years

40	IITM/AN/SAG/280	Next- generation WLANs	Arista Networks	Dr. Samar Agnihotri	School of Computing & Electrical Engineering	8,50,000	2 years
41	IITM/SERB/PM/281	Function and mechanisms of sorcin in diet induced fatty liver diseases and lipid metabolism	SERB	Dr. Prosenjit Mondal and Dr. Subrata Ghosh (Co-PI Dr. Mohan Kamthan (Co-PI)	School of Basic Sciences	43,60,000	3 years
42	IITM/SERB/RG/282	Mechanistic insights into the folding and function of Zika Virus NSI protein: implications for replication complex formation	SERB	Dr. Rajanish Giri	School of Basic Sciences	57,97,000	3 years
43	IITM/SERB/TPS/283	Evaluation and design of novel synthetic microbial consortia for bioprocessing of rubber and plastic waste to industrial biomolecules	SERB	Dr. Tulika P. Srivastava and Dr. Shyam Kumar Masakapalli (Co-PI)	School of Basic Sciences	41,51,400	3 years
44	IITM/SERB/SB/284	Identification problem on dynamic equation on time scale	SERB	Dr. Syed Abbas	School of Basic Sciences	6,60,000	3 years
45	IITM/SERB/TJ/285	Cyber-physical attack resilience based coherent power management in smart district (ECONOMETRICS)	SERB	Dr. Tushar Jain	School of Computing & Electrical Engineering	6,60,000	3 years
46	IITM/SERB/AH/286	Low cost flexible and rechareable Zn-air battery for portable device application	SERB	Dr. Aditi Halder	School of Basic Sciences	42,17,400	3 years
47	IITM/HDC/SKM/287	Farming of unexplored herbs of mid-himalayan region and develop a sustainable supply model involving local farmer in the mid-himalayan region	Himalayan Drug Company	Dr. Shyam Kumar Masakapalli	School of Basic Sciences	5,68,800	1 year
48	IITM/DST/VD/288	National mission on interdisciplinary cyber physical system (NM-ICPS) implementation mechanisms- Technology innovation hubs (TIH s)	DST	Dr. Prem Felix Siril and Dr. Varun Dutt, Dr. Arnav Bhavsar, Dr. Anil K Sao, Dr. Aditya Nigam, Dr. Gopi Srikanth Reddy, Dr. Srikant Srinivasan, Dr. Dileep AD and Dr. Satyajit Thakor are the (Co-PIs)	School of Basic Sciences AND School of Computing & Electrical Engineering	7,25,00,000	5 years
49	IITM/ICSSR/RT/289	Do health policies require to address gender related unique needs to control non-communicable disease in India	ICSSR	Dr. Ramna Thakur	School of Humanities & Social Sciences	10,00,000	2 years
50	IITM/DRDO/AS/290	Study of mode-wise thermal conductivity and surface- state transport in bismuth-antimony chalcogenide samples of DLJ using Raman Spectroscopy and physical property measurement system	DRDO	Dr. Ajay Soni	School of Basic Sciences	15,24,000	1 year

51	IITM/IBM-CAS/MTH/291	SPARE: Safe Portable partial- Analaysis REsults for Java programs	IBM Canada	Dr. Manas Thakur and Prof. Krishna Nandivada (PI) from IIT Madras	School of Computing & Electrical Engineering	6,00,000	1 year

INTERNAL PROJECTS

S. No.	IIT Mandi Reference No./ Project No.	Project Title	Sponsoring Agency	Principal Investigator & Co-ordinator(s)	Department/ School	Amount Sanctioned (in Rs.)	Duration of Project
1	IITM/INT/TPS/20	Operations, management and data analytics of the next generation sequencing (NGS) facility	IIT Mandi	Dr. Tulika P Srivastava	School of Basic Sciences	6,00,000	1.1 year
2	IITM/INT/SCJ/21	DIY Kit & Tinkering Lab	IIT Mandi	Dr. SC Jain (PI) Dr. Rajeev Kumar Dr. Rahul Vaish Dr. Srikant Srinivasan Dr. Hitesh Shrimali Dr. Chander Shekhar Dr. Syed Abbas Dr. Aditi Halder Dr. Shyam Kr. Masakapalli	School of Engineering and School of Basic Sciences and School of Computing & Electrical Engineering	10,00,000	1 year

SPONSORED CONSULTANCY RESEARCH PROJECTS

S.No.	File no.	Proposal Title	Faculty name	Agreement signed with	Amount Sanctioned (in Rs.)	Duration of Project
1	IITM/CONS/DIF/KVU/31	Soil Anchor design and proofchecking	Dr. K.V.Uday (PI) and Dr. Mahesh Reddy G (Co-PI)	Mr. Dinesh Kumar Sharma, Design India Forum, C-14, Aruna Park, Laxmi Nagar, Delhi- 110092	1,53,400	1 month
2	IITM/CONS/IHBT/RS/32	The structural design of IHBT campus at keylong in himachal pradesh	Dr. Rajneesh Sharma (PI) and Dr. Kaustav Sarkar (Co-PI)	Er. Anil Kumar, IHBT, Palampur, Himachal Pradesh	3,06,800	6 months
3	IITM/CONS/RxDSI/VD/33	Evalution of quantitative systems pharmacology and machine learning models for blood glucose prediction	Dr. Varun Dutt	Mr. Larry A. Pickett, Rx Data Science Inc., 800 Park offices drive, suite 1013, NC- 27709	15,26,400	30 months
4	IITM/CONS/SW-FDFA/SDG/34	Vulnerability profiles for India: State and District level (Phase-II)	Dr. Shyamasree Dasgupta	Dr. Mustafa Ali Khan, Team Leader, IHCAP, Swiss Agency for Development & Cooperation, Delhi	65,52,238	5 months
5	IITM/CONS/CERT/RS/35	Vetting of the structural analysis and drawings for frawings for MSP 8 avalanche shed between Manali/ Sarchu Road in Himachal Pradesh	Dr. Rajneesh Sharma (PI) Dr. Kaustav Sarkar (Co-PI)	Er. Anil Kumar Chief Engineer Rohtang Tunnel Division Manali H.P.	3,06,800	3 months

6	IITM/CONS/CTRC/RS/36	Vetting of the structural analysis and drawings for lift structure proposed at Dalai Lama Temple Mcleodgar D-Shala	Dr. Rajneesh Sharma	Wangdy Tsering (Executive Secretary) Central Tibetan Relief committee (CTRC), CTA, D-S, H.P. a	98,040	1 month
7	IITM/CONS/UoQ/GB/37	A validated CFD model of the Hydrofloat: preliminary modelling and simulation	Dr. Gaurav Bhutani	Mr. Joe McLean, Director Research Partnerships, University of Queensland	4,84,113	6 months
8	IITM/CONS/MIPT/HP/38	Vetting of drawings & design calculation for tanks	Dr. Hinshu Pathak (PI) Dr. Sunny Zafar (Co-PI)	Mr. Dharmender Yadav, Motiprabha Infratech Pvt. Ltd. Unit no.- 804, 8th floor, SSR corporate park 13/6 Mathura road NH-2, Faridabad, Haryana- 121003	75,600	1 month

SEED GRANT PROJECTS

S.No.	File no.	Proposal Title	Faculty name	Department/School	Amount Sanctioned (in Rs.)	Duration of Project
1	IITM/SG/PKU/67	Intelligent design of intakes for hydraulic machines to retard the vortex induced entrainment	Dr. Parmod Kumar	School of Engineering	8,00,000	3 years
2	IITM/SG/MD/68	Charging and Power management of permanent magnet synchronous machine based electric vehicle for hilly driving cycle	Dr. Moumita Das (PI) Dr. Himanshu Misra (PI)	School of Computing and Electrical Engineering	15,00,000	3 years
3	IITM/SG/SWS/69	Large scale production of high quality carbo from urban solid waste	Dr. Swati Sharma	School of Engineering	10,00,000	3 years

2. Project Oriented B.Tech. Curriculum

Historically, the IITs had a B.Tech. curriculum that was aimed at training experts in each specific branch for a career in research or engineering in the branch. The curriculum had a large and strong core covering all sub-areas of the branch in depth. There was also a substantial component in basic sciences and engineering fundamentals. The courses were carefully sequenced with the assumption that all students would take them in lock-step. With changes in society and the nature of technology, IIT Mandi has taken a fresh look at the B.Tech. curriculum. As an Indian Institute of Technology, it is our duty to train leaders for the growth of India with a strong technology focus. The necessary and desirable characteristics of our B.Tech. graduates are:

- Self-motivated with a passion to do something useful.
- The ability to learn quickly and devise innovative solutions.
- The ability to work hard, in a focused and disciplined manner.
- A solid foundation in basic principles and substantial practical hands-on experience.
- Sufficient specific knowledge to be immediately productive.
- The ability to communicate effectively and work with others.
- With these characteristics, our graduates can be expected to make their mark, enhance IIT's reputation and recompense the nation for its investment in their education.

The foundations of all B.Techs. are: Facility in design and innovation; strong understanding of common scientific and engineering principles and methods; and breadth of knowledge outside science and engineering i.e. in the humanities, social sciences and management.

Next is the core of knowledge in the student's chosen branch. This is kept to the bare minimum, with principles and techniques being learnt in theory courses, in labs or in practicums. Finally, we have a large number of specialist baskets. Many of these are interdisciplinary. In each basket, the horizontal line divides the basic from the advanced courses. The boundaries in the curriculum diagram have deliberately been drawn in a vague and overlapping manner. This is to emphasize the flexibility and the inherently inter-disciplinary nature of tomorrow's B.Tech. graduate.

2.1 Design Practicum

IIT Mandi running unique flagship U. G. course named as “Design Practicum (DP)”. In this course, second year level B.Tech students learn product design and development skills. This course is designed to connect the technological knowledge with social issues in day to day life, like pollution (air, water & noise), sanitation, claimant change, public security & safety, health, agriculture etc. In this regard, interdisciplinary teams of five to six students, randomly selected from different branches, propose product ideas and then build working prototypes. The expected learning outcomes of this program are the ability to work in interdisciplinary teams, coordination, delegation, leadership, technical learning, planning and integrity, learning by mistakes and team work. Many of these innovative low cost product ideas are derived from the needs of the society.The products successfully built and demonstrated in the previous years include a wall climbing robot, fire-fighting robot, gesture-controlled 3-D hologram, automated ration vending machine etc. Such products have huge potential to be used in public safety, security and defence for saving the valuable human life.

Around 200 local school children (10^{th} to 12^{th} standard) and teachers witness the DP Open house 2019-20, IIT Mandi outreach program to inspire, motivate young minds and witnessed the good

quality expertize of IIT Mandi students. Their scientific, technological approach will overcome the social problems with innovative solutions.

2.2 Interactive Socio-Technical Practicum (ISTP)

IIT Mandi has a unique course curriculum wherein an interdisciplinary academic culture is encouraged and the curriculum is substantially oriented towards design and innovation. One of the courses under the design and innovation stream is the Interactive Socio-Technical Practicum (ISTP), which is offered to 3rd year B.Tech. students. Every year, a team of students from the Worcester Polytechnic Institute (WPI), USA, visits the IIT Mandi campus for two months to work on joint projects with social relevance. Student teams engage in extensive field-work before assessing a specific real-world problem from all dimensions and proposing technological solutions for the same.

In 2019-20, posters, prototypes and models were displayed under ISTP projects which involves 55 IIT Mandi students, 25 WPI students, 2 WPI faculty mentors, 18 IIT Mandi faculty mentors and NGO partners.

Detailed information about the modalities of the course and all project reports are available here: http://www.iitmandi.ac.in/ISTP/

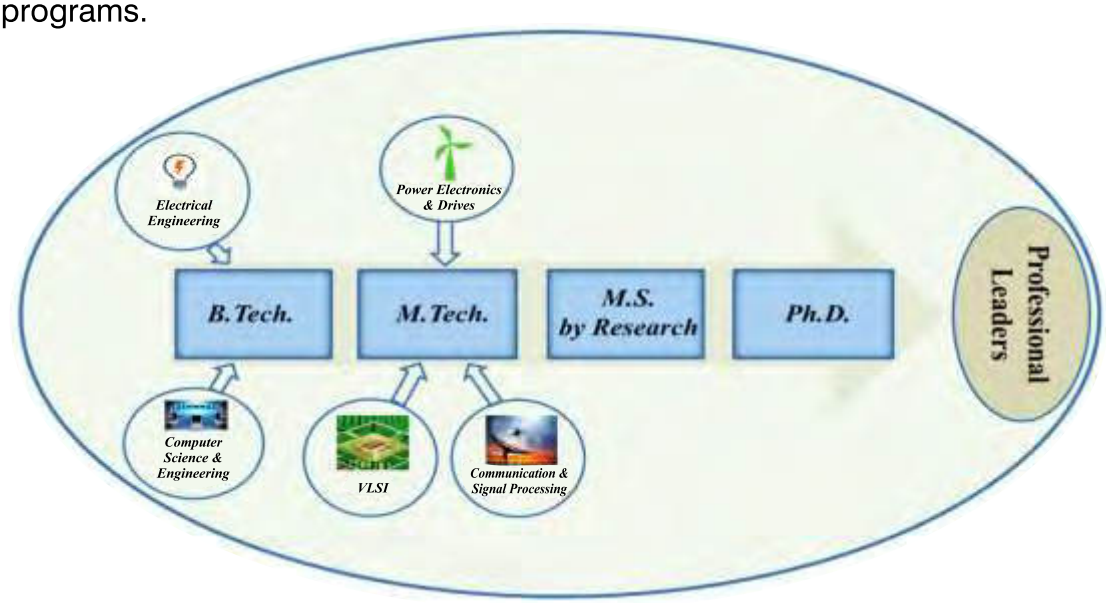
3. Academic Schools

3.1 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 and Electrical Engineering has 40 Faculty members, 7 Staff Members and around 91 Ph.D Students, 118 Masters students and 400 B.Tech Students. It has five broad areas namely Power Electronics and Drives, Controls and Sensors, VLSI, Signal Processing and Communications, Computer Science and Engineering.

The School offers 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	58
B. Tech. (Electrical Engineering)	2009	55
M. Tech. (VLSI)	2016	34
M. Tech. (Communication & Signal Processing)	2017	34
M. Tech. (Power Electronics & Drives)	2017	34
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 members 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 were around 83 Journal Papers, and 131 Peer Reviewed Conference Papers, 4 book/book chapters and 4 patents filed in 2019-20.

For more information:

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

S. No.	Name	Specialization & Research Intersts	Photograph
1	**Dr. Bharat Singh Rajpurohit, Associate Professor & Chairperson** http://faculty.iitmandi.ac.in/~bsr/	Renewable Energies, Power Electronics and grid integration of Renewable Energies, Power System Harmonics, Power System (Operation, Control and Analysis), Parameter Estimation of electrical Machines	
2	**Dr. Adarsh Patel, Assistant Professor** http://faculty.iitmandi.ac.in/~adarsh/	Wireless Communications and Networks with the applications of signal processing, Game Theory, Machine Learning, Tensors, and Optimization based techniques.	
3	**Dr. Aditya Nigam, Assistant Professor** http://faculty.iitmandi.ac.in/~aditya/	Deep Learning, Biometrics, Computer Vision, Image Processing, Computer Vision and Machine Learning	
4	**Dr. Amit Kumar Singha, Assistant Professor** http://faculty.iitmandi.ac.in/~amit/	GaN-Based High-Frequency DC-DC Converters, DC-DC Converters for IoT Applications & Bifurcation Analysis of Digitally Controlled DC-DC Converter	
5	**Dr. Anil K. Sao, Assocaite Professor** http://faculty.iitmandi.ac.in/~anil/	Medical Image Processing, Speech processing, Microscopy Image processing, Sparse representation	
6	**Dr. Ankush Bag, Assistant Professor** http://faculty.iitmandi.ac.in/~ankushbag/	Semiconductor Devices, Epitaxy and Compound Semiconductors	

7	**Dr. Arnav Bhavsar Vinayak,** **Assocaite Professor** http://faculty.iitmandi.ac.in/~arnav/	Image Analysis, Computer Vision, Machine Learning	
8	**Dr. Arti Kashyap,** **Assocaite Professor** http://faculty.iitmandi.ac.in/~arti/	Magnetism and Magnetic Materials,Distributed database application development and Big data Analytics	
9	**Dr. Astrid Kiehn,** **Visiting Associate Professor** http://faculty.iitmandi.ac.in/~astrid/	Distributed Algorithms, Verification, Theoretical Computer Science	
10	**Prof. B.D Chaudhary,** **Emeritus Professor**	Software Technology	
11	**Prof. Deepak Khemani,** **Mentor Professor** http://aidblab.cse.iitm.ac.in/khemani//	Artificial Intelligence, Knowledge Representation and Reasoning, Ontologies, Case Based Reasoning, Automated Planning, Constraint Planning, Natural Language Processing	
12	**Dr. Dileep A.D.,** **Assocaite Professor** http://faculty.iitmandi.ac.in/~addileep/	Pattern Recognition, Kernel Methods for Pattern Analysis, Machine Learning, Speech Technology, Computer Vision	
13	**Dr. Gopi Shrikanth Reddy,** **Assistant Professor** http://faculty.iitmandi.ac.in/~gopishrikanth/	Antennas and Wave Propagation, Microwave Passive component, FSS EBG Architecture structures, Metamaterials	
14	**Dr. Himanshu Misra,** **Assistant Professor** https://sites.google.com/view/himanshumisra/home	Doubly fed induction Generator, Electrical Machines, Electric Drives, Special Electrical Machines, Electric vehicle, Renewable Energy, Power converters, DC power generation from rotating electric machines	
15	**Dr. Hitesh Shrimali,** **Assocaite Professor** http://faculty.iitmandi.ac.in/~hitesh/	Design and Testing of Radiation Hard Circuits (CMOS Silicon Detectors), Analog and Mixed signal VLSI design, Analog-to-Digital Converters, Design of Radiation Hard Circuits (Space Application), Modeling Of Radiation Effects On Analog and Mixed Signal Circuits	

16	**Dr. Jinesh Machchhar,** **Assistant Professor** http://faculty.iitmandi.ac.in/~jinesh/	Geometric modeling, Simulation, Design	
17	**Dr. Kunal Ghosh,** **Assocaite Professor** http://faculty.iitmandi.ac.in/~kunal/	Silicon solar cells, Performance and reliability analysis of photovoltaic modules	
18	**Dr. Manas Thakur,** **Assistant Professor** https://manas.gitlab.io/	Program analysis, compilers, programming languages	
19	**Dr. Moumita Das,** **Assistant Professor** http://faculty.iitmandi.ac.in/~moumita/	Electric Vehicles: Power Converters and Control, Storage Aspect, Application of Wide Bandgap Devices (SiC, GaN) in Power Electronics & Use of Renewable Energy Sources for Charging of Electric Vehicles	
20	**Dr. Narsa Reddy Tummuru,** **Assistant Professor** http://faculty.iitmandi.ac.in/~tummuru/	Hybrid Energy Storage Applications in Future Microgrids, Efficient Power Electronic Interfaces in Renewable Energy Applications, Smartgrid Communication Networks, Switched Mode Power Converters, Dynamic Wireless Power Transfer in Electrical Vehicle Application	
21	**Dr. Padmanabhan Rajan,** **Assocaite Professor** http://faculty.iitmandi.ac.in/~padman/	Speech and Audio Processing, Analysis of Music, Bioacoustics (Analysis of Natural Sound-Bird Calls, Animal Vocalisation),Machine Learning and Pattern Recognition	
22	**Dr. Pratim Kundu,** **Assistant Professor** http://faculty.iitmandi.ac.in/~pratim/	Development of techniques for enhancing the reliability of power system operations using wide area measurements to avoid cascading failures. The research focusses on developing computational algorithms to improve smart grid operations	
23	**Dr. Rahul Shrestha,** **Assistant Professor** http://faculty.iitmandi.ac.in/~rahul_shrestha/	VLSI Design and Circuits & Systems for Signal Processing and Wireless Communication.	
24	**Prof. Rajan Kapur,** **Adjunct Professor** President, Larankelo Ventures LLC Boulder, Colorado, USA	Renewable Energy Industrial Electronics Head Mounted Displays	

25	**Prof. Ramesh Oruganti, Adjunct Professor** http://faculty.iitmandi.ac.in/~rameshо/	Power Electronics, Solar photovoltaic energy systems	
26	**Dr. Rameshwar Pratap, Assistant Professor** https://sites.google.com/site/pratapрameshwaryadav/home?authuser=0	Igorithms in Data Science and Machine Learning. In particular, I am interested in Scalable Data Science, Sublinear Algorithms, Machine Learning, Data Mining, Deep Learning.	
27	**Dr. Renu M. Rameshan, Assistant Professor** http://faculty.iitmandi.ac.in/~renumr/	Image Processing, Computer vision, Ill-posed problems	
28	**Dr. Samar Agnihotri, Assocaite Professor** http://faculty.iitmandi.ac.in/~samar/	Information Theory, Wireless Communications	
29	**Dr. Satinder Sharma, Assocaite Professor** http://faculty.iitmandi.ac.in/~satinderр/	Nanoelectronics,Sensors, Photovoltaic & self-assembly	
30	**Dr. Satyajit Thakor, Assocaite Professor** https://sites.google.com/site/satyajitтhakor/	Resource allocation in Wireless Networks, Wireless Energy Harvesting and Crowd sensing	
31	**Dr. Shubhajit Roy Chowdhury, Assocaite Professor** http://faculty.iitmandi.ac.in/~src/	Biomedical Embedded Systems,Non-invasive diagnostic systems, Near Infrared Spectroscopy, VLSI Architectures	
32	**Dr. Siddhartha Sarma, Assistant Professor** http://faculty.iitmandi.ac.in/~siddharтha/index.html	Resource allocation in Wireless Networks, Wireless Energy Harvesting and Crowd Sensing, Wireless Sensor Network and IOT	
33	**Dr. Sreelakshmi Manjunath, Assistant Professor** http://faculty.iitmandi.ac.in/~sreelakшmi/	Communication Networks, Vehicular Networks, Control Theory, Non-linear Dynamics, Non-linear Controller Design&Time-delayed Systems	

34	**Dr. Srikant Srinivasan,** **Assocaite Professor** http://faculty.iitmandi.ac.in/~srikant_srinivasan/	IOT in Outdoor Environments, Raspberry Pi Sensor Networks, Machine Learning, Data Mining, Image Processing, Nanoelectronics/ Spintronic Device Modelling and Simulation Using Quantum and Semi-Classical Transport Techniques	
35	**Dr. Srinivasu Bodapati,** **Assistant Professor** http://faculty.iitmandi.ac.in/~srinivasu/	VLSI Circuits and Systems,Cyber Security and hardware Security, Nanoelectronics and Emerging technologies, FPGA based system design and DSP applications &Physical Unclonable Functions	
36	**Dr. Sriram Kailasam,** **Assistant Professor** http://faculty.iitmandi.ac.in/~sriramk/	Distributed Complex Event Processing, Cloud Resource Scheduling, Scalable Algorithms for Formal Concept Analysis, Data Analytics for Scientific Data	
37	**Prof. Timothy A. Gonsalves,** **Director till 30.06.2020 and** **Professor** http://faculty.iitmandi.ac.in/~tag/	Computer networks and distributed software systems	
38	**Dr. Tushar Jain,** **Assistant Professor** http://faculty.iitmandi.ac.in/~tushar/	Control theory, fault tolerant control, industrial process control	
39	**Dr. Varun Dutt,** **Associate Professor** http://faculty.iitmandi.ac.in/~varun/	Artificial Intelligence, Human-Computer Interaction, Judgment and Decision Making, Environmental Decision Making	
40	**Dr. Varunkumar Jayapaul,** **Assistant Professor** http://faculty.iitmandi.ac.in/~varunkumar/	Algorithms and Data Structures	
41	**Prof. Yvonne Dittrich,** **Adjunct Professor** IT University Copenhagen https://www.itu.dk/~ydi/ShortCV.htm	Software Engineering	

List of Staff Members:

S. No.	Name & Designation	Designation & Qualifications	
1	Mr. Tarun Verma	Junior Lab Assistant Diploma (Electronics), B.Tech. (Electronics)	
2	Ms. Nalini Singh Gill	Junior Assistant MCA	
3	Ms. Rakhi Sankhyan	Office Assistant B.Sc. (IT), MBA (HR)	
4	Mr. Shivam	Lab Technical Assistant Diploma (Electrical), Pursuing AMIEE (Electrical)	
5	Mr. Arun Kumar	Lab Technical Assistant ITI (Electronics Trade)	
6	Ms. Taruna Kumari	Lab Technical Assistant BE & ME Pursuing	
7	Mr. Maneshwar	Multi-Tasking Staff ITI (Welder Trade)	

New Projects

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

Externally Sponsored Research Projects

S. No.	Project Title	Sponsoring Agency	Investigator	Amount Sanctioned (in Rs.)	Duration of Project
1	Design of IoT trans- receiver integrated with compact MIMO/ Diversity antenna scheme Date of Sanction: 02.04.2019 Date of Completion: 01.04.2022	DST, ICPS	Dr. Gopi Shrikanth (PI) from IIT Mandi and Dr. Mahima Arrawatia (Co-PI), IIT Jodhpur	42,92,880	3 Years

2	High- throughput & energy-efficient flexible- turbo / LDPC decoder for the next generation wireless communication system Date of Sanction: 02.04.2019 Date of Completion: .01.4.2022	DST, ICPS	Dr. Rahul Shrestha	38,82,960	3 Years
3	VLSI Chip designing research - Young Faculty Research Fellowship (YFRF) Date of Sanction: 11.04.2019 Date of Completion: 10.04.2021	DIC-YFRF	Dr. Hitesh Shrimali	14,80,000	2 Years
4	Young Faculty Research Fellowship (YFRF) Date of Sanction: 11.04.2019 Date of Completion: 10.04.2021	DIC-YFRF	Dr. Anil Kumar Sao	14,80,000	2 Years
5	Next generation dynamic capacitive and inductive power transfer topologies in green e-transportation systems Date of Sanction: 21.05.2019 Date of Completion: 20.05.2022	SERB	Dr. Tummuru Narsa Reddy	41,43,832	3 Years
6	A game theoretic approach innolving experimentation and computational modelling of hacker's decision using deception in cyber security Date of Sanction: 26.07.2019 Date of Completion: 25.07.2022	DST-ICPS	Dr. Varun Dutt (PI)		3 Years
7	Distributed algorithms for formal concept analysis Date of Sanction: 31.05.2019 Date of Completion: 30.05.2021	MHRD-SPARC	Dr. Sriram Kailsam as Principal Investigator (PI), Dr. Astrid Kiehn (Co-PI) from IIT Mandi and collaboration with Dr. Sergie Obiedkov (PI) and Dr. Aleksey Buzmakov (Co from National -PI) Research University-Higher School of Economics (HSE), Russia	42,59,040	2 Years
8	Modeling, Analysis,Design and control of a high frequency DC-DC converter for internet of things applications Date of Sanction: 31.10.2019 Date of Completion: 23.07.2027	DST	Dr. Amit Kumar Singha	35,00,000	5 Years
9	Multimodal Bird Analytics Date of Sanction: 20.10.2019 Date of Completion: 19.10.2021	NMHS	Dr. Padmanabhan Rajan	34,36,200	2 Years

10	Classification of sonar signals using deep convolution neutral networks Date of Sanction: 23.09.2019 Date of Completion: 22.09.2021	DRDO	"Dr. Padmanabhan Rajan (PI), Dr. Dileep A.D (Co-PI)"	16,46,800	2 Years
11	Visual scene understanding Date of Sanction: 14.01.2020 Date of Completion: 13.01.2022	SERB-NPDF	"Dr. Amit Satish Unde (PI) Dr. Renu M Rameshari (Mentor)"	19,20,000	2 Years
12	Next- generation WLANs Date of Sanction: 17.01.20 Date of Completion: 16.01.22	Arista Networks	Dr. Samar Agnihotri (PI) from IIT Mandi	8,50,000	2 Years
13	Technology Innovation Hub	DST	"Dr.Varun Dutt (PI) Dr. Srikant Srinivasan (Co-Pi)"	7 Crores	
12	DIY Kits and Tinkering Lab Date of Sanction: Oct 2019 Date of Completion: Oct 2020	IIT Mandi	Prof. S. C Jain (PI) Dr. Srikant Srinivasan (Co-Pi)"	10,00,000	1 Year
14	Development of high accuracy Machine Learning diagnostics for pest and disease management for agricultural crops Date of Sanction: April 2019 Date of Completion: Oct 2020	DST	"(PI) Dr. Srikant Srinivasan &Co-PI: Dr. Anil Sao, Dr. A. D. Dileep	3,00,000	1 year
15	Advanced coordinated control and projection of intelligent dc microgrids India- Bulgaria Joint Research Projects 2019-2021	DST	(PI: Dr. Bharat Singh, Co-PI: Dr. Narsa Reddy).	11,82,350	2 years
16	Technical Innovation Hub in Human Computer Interaction Status: Awarded Start Date: April 2020 End Date: April 2024	DST	(PI: Dr. Varun Dutt , Co-PI: Dr. Arnav Bhavsar Dr. Anil K Sao Dr. Dileep A D Dr. Aditya Nigam Dr. Srikant Srinivasan Dr. Gopi Srikant Reddy).	7.25 Crores	5 Years
17	A low- cost MEMS-based and video-based monitoring and early warning system for rainfall-induced landslides Status: Accepted Proposed duration:	NRDMS-DST	(PI: Dr. Uday K V , Co-PI: Dr. Varun Dutt, Dr. Arnav Bhavsar.	40,00,000	3 years
18	Design and fabrication of an interface ASIC for a vibratory gyroscope sensor application	ISRO	Dr. Satinder Sharma	49,00,000	3 years
19	Technology Incubation & Development of Entrepreneurs (TIDE 2.0)	MeitY	Cordinator Dr. Satinder Sharma	1.7 Crores	4 years
20	Tailoring the nanoscale properties of Graphene and its derivatives via strain engineering for next generation nanoelectronics devices	DST	PI: Dr. Praeep Kumar, SBS and co-PI Dr. Satinder Sharma	49,00,000	3 years

Seed Grant Projects

Sr. No.	Projects Title	File No.	Investigator	Amount Sanctioned (in Rs.)	Duration of Project
1	Charging and Power management of permanent magnet synchronous machine based electric vehicle for hilly driving cycle Date of Sanction: 17.12.2019 Date of Completion: 16.12.2022	IITM/SG/MD/68	"Dr. Moumita Das(PI) Dr. Himanshu Misra (PI)"	15,00,000	3 years

Sponsored Consultancy Research Projects

S.No.	Proposal Title	Faculty name	Agreement signed with	Amount Sanctioned (in Rs.)	Duration of Project
1	Evalution of quantitative systems pharmacology and machine learning models for blood glucose prediction Signing Date- 30.08.19 Completion Date- 28.02.22	Dr. Varun Dutt	Mr. Larry A. Pickett, Rx Data Science Inc., 800 Park offices drive, suite 1013, NC- 27709	15,26,400	3 years

Major Research Achievements including Products/Technologies developed/ ISTP/DP/MTP Outcome

1. Dr. Varun Dutt and the Applied Cognitive Laboratory, SCEE, IIT Mandi has recently developed:
   - Low cost landslide monitoring system.
   - Low-cost air-pollution monitoring system.
   - HackIT: A real-time simulation tool for studying real-world cyber-attacks in the laboratory.
   - Deception game (A game theoretic framework to evaluate the decision making of a hacker).
   - Email spam classification system.
   - Ensemble and adversarial machine learning algorithms for predicting healthcare expenditures.

2. Dr. Gopi Shrikant Reddy has guided a Design Practicum project on Automated Railway track- crack detection, student group which won first price in open house.
3. Dr. Aditya Nigam has developed folowing:

Biometric Database Indexing: Iris is considered as one of the best biometric traits owing to its unique and distinctive features. Moreover, it is well protected and age-invariant biometrics. However, still, it suffers from many challenging issues like obscuring eyelids, eye-lashes, motion-blur, reflection, contact-lenses, and many more. A large number of people Worldwide (around one billion) have enrolled their iris images in various databases across the globe. Thus, real-time retrieval of iris images from voluminous datasets is a need of the current hour. One possible solution is to use

indexing strategies. The goal of any indexing technique is to reduce the number of comparisons required while performing authentication in a huge database. It can be achieved by only considering the semantically neighboring query indices instead of the entire database. Thus, we propose an iris indexing scheme using real-valued deep iris features binarized to iris bar codes (IBC) compatible with the indexing structure. To the best of our knowledge, this is the first attempt in designing an end-to-end network for iris indexing. Further, the experimental results depict the efficacy of our proposed approach.

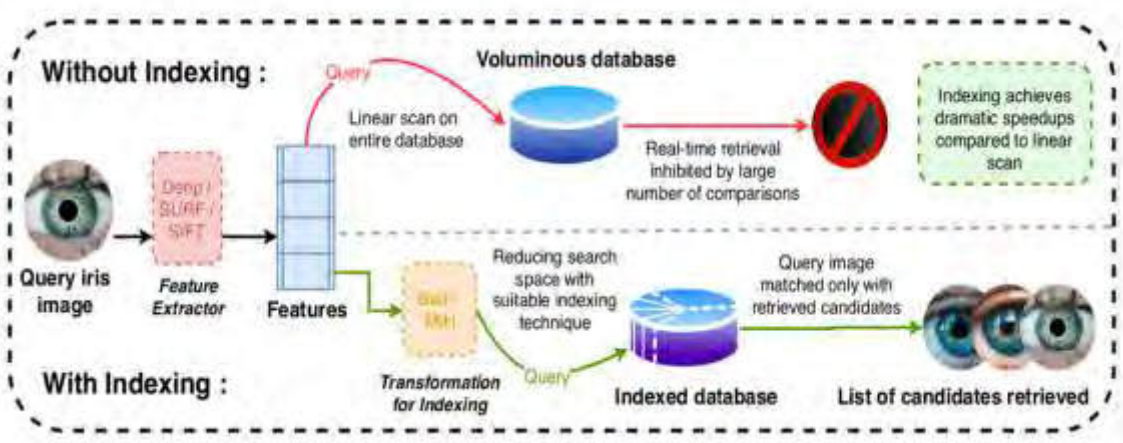


Figure1: Depicting the advantage of indexing Iris image. The upper part depicts the scenario in which the extracted iris features are directly stored in the database without indexing. The lower part employs indexing to store iris images.

Biometric Template Protection: In order to use biometric-based authentication in the banking domain, it is vital to secure biometric databases from unauthorized access. As we all know a biometric trait is immutable, thus if it is stolen it is lost forever. Therefore, securing biometric databases is a paramount concern in today's digital World. Thus, we have presented a comprehensive study of biometric template protection schemes majorly focusing on cancelable biometric techniques. Moreover, we have proposed a cancelable finger dorsal template generation network trained on trait-specific features without using any pre-trained network framework. The experimental results are evaluated on two benchmark publicly available finger knuckle databases: PolyU FKP and PolyU Contact-less FKI. We have also performed an in-depth security analysis of the proposed framework in terms of invertibility, revocability and unlinkability.

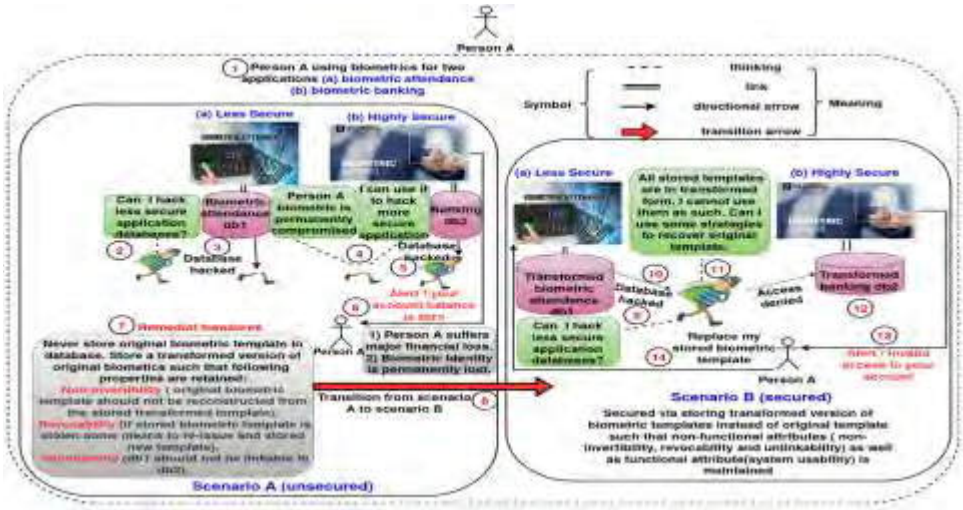


Figure 2: Depicting two scenarios: Scenario A and Scenario B. Scenario A is vulnerable against adversarial attack while Scenario B is protected via biometric template protection (cancelable biometrics). Here steps are sequentially numbered in red and circled.

Personalizing First Person Video Games using Egocentric Gait Transfer: Video and computer games are the fastest-growing segment of the entertainment industry with first-person games (FPGs) accounting for 11% of the video and computer game sales. Though, the concept of the controllable avatar is common in third-person games, such personalization options are limited for FPGs due to the absence of the avatar in the view. We have proposed a novel personalization strategy for FPGs by transferring a player's walking style to the avatar. The input to the proposed system is an egocentric video from the player. We extract the camera trajectory from the egocentric videos and pose the problem as extracting, and transferring the gait style from these trajectories to the protagonist's motion in the game. We propose a novel mechanism to extract the gait style from trajectories using guided-backpropagation in the proposed deep neural network trained for classifying the wearer based upon his/her egocentric video. We demonstrate the performance of our gait style transfer engine, by adding the extracted style features to a given smooth trajectory in a first-person game. To validate our output, we use a third party egocentric gait classifier developed by Hoshen and Peleg (HP). We take the publicly available egocentric videos from Disney dataset, transfer the gait of those wearers to the game scene using our technique, and generate synthetic game videos. We show that our synthetic videos are able to fool the HP classifier in believing that it is a real video from the same wearer, with an accuracy of 74.02%. We have also performed an extensive human perceptual analysis to confirm the end-user preference for the generated gait augmented game videos.

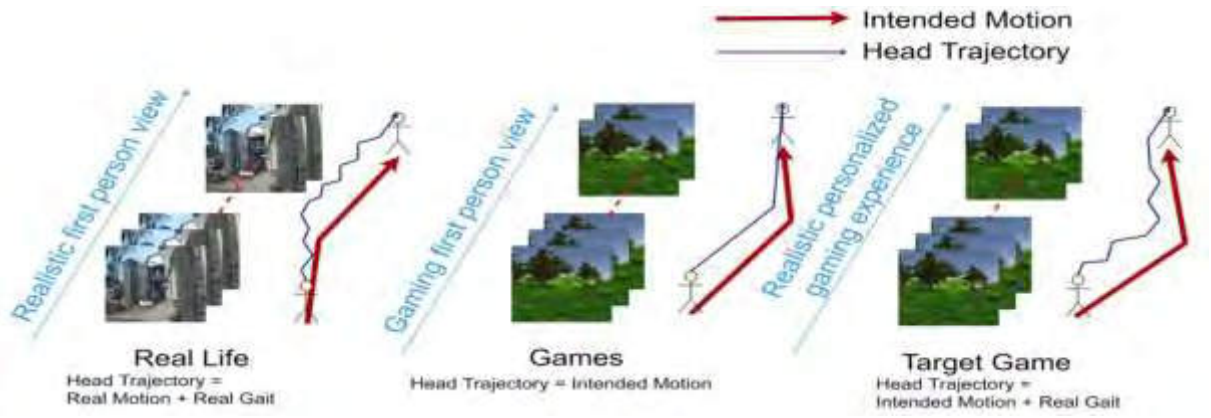


Figure 3: We propose a novel personalization strategy for first-person games, by extracting the gait style from the egocentric videos, and overlaying them on the FPG while leaving the intended motion in the FPG untouched. The figure shows the proposed pipeline.

Multi-Shell D-MRI Reconstruction via Residual Learning utilizing Encoder-Decoder Network with Attention (MSR-Net): Contemporary diffusion MRI based analysis with HARDI, which provides more accurate fiber orientation, can be performed using single or multiple b-values (single or multi-shell). Single shell HARDI cannot provide volume fraction for different tissue types, which can produce bias and noisier results in the estimation of fiber ODF. Multi-shell acquisition can resolve this issue. However, it requires more scanning time and is therefore not very well suited in a clinical setting. Considering this, we propose a novel deep learning architecture, MSR-Net, for reconstruction of diffusion MRIvolumes for some b-value using acquisitions at another b-value.In this work, we demonstrate this for b = 2000s/mm2 and b = 1000s/mm2. We learn such a transformation in the space of spherical harmonic coefficients. The proposed network consists of encoder-decoder along-with an attention module and a feature module. We have considered L2 and Content Loss for optimizing and improving the performance. We have trained and validated the network using the HCP data-set with standard qualitative and quantitative performance measures. We show via. various quantitative results and visualizations that our proposed network yields promising results.

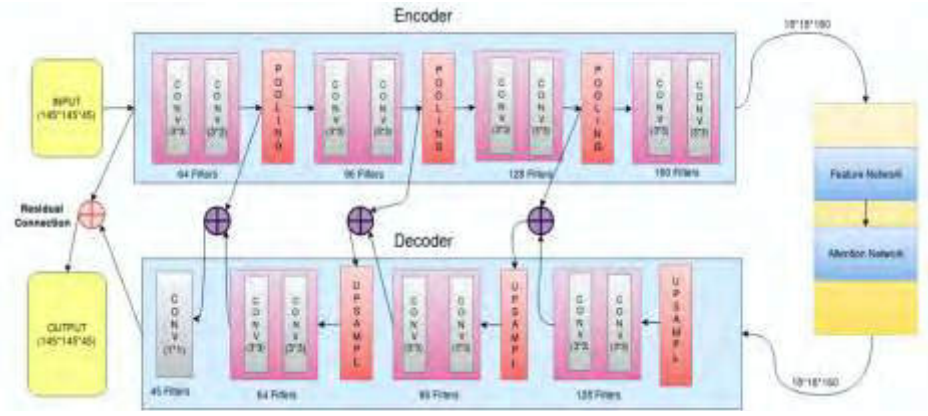


Figure 4: Proposed Network: Encoder-Decoder Network (EDN) along with Bottleneck.

4. Dr. Shubhajit Roy Chaudhuri has developed following:

- Developed spiking electrodes for non invasive brain stimulation. Currently the electrodes are under animal trial (with rats) at IHBT Palampur for testing of patient specific non invasive brain stimulation.

Figure 1. (a) Fabricated electrode mould and packaging (b) Positioning fabricated electrode on interested region of brain with conductive gel and doctors' tape (c) Fabricated electrode made compatible with tDCS device (d) Fabricated electrode made compatible wit RMS EEG device.

- Developed an algorithm for finding out location for non invasive brain stimulation. The algorithm has been recognized by NIMHANS Bengaluru as an effective approach for brain stimulation for electroceutical post stroke restorative neurorehabilitation. The algorithm has been successfully tried out on 7 patients with success. They are likely to take forward our algorithm for clinical trials I and II and on successful completion, are likely to adopt it in it their therapeutic procedure.
- Developed a model for astrocyte linked neuro-glial-vascular pathway leading to neurovascular coupling and cerebrovascular reactivity that is used for ascertaining the cortical excitability response for non-invasive brain stimulation. The model has successfully undergone animal trial (with sheep) at the University at Buffalo, State University of New York.
- Successfully conducted clinical trials on human subjects with the developed tDCS device at PGIMER Chandigarh in collaboration with Prof. Dheeraj Khurana, to diagnose ischemic stroke and traumatic brain injury.
- Developed version 3 of the portable device for estimation of albumin in urine using near infrared spectroscopy. The device has been tested with human urine samples and has also been demonstrated at Open House of IMPRINT held on August 4, 2019 at IIT Delhi.

- Developed a small prototype of 25mT MRI system. The device has been tested on a China rose (Hibiscus rosasinensis) leaf. The results have been used to submit a proposal to SERB under exponential technologies scheme.

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- [C3]Joe Johnson and Srikant Srinivasan, "Deep Learning Model for Multi-Spectral UAV Imagery for Distinguishing between Potato Plant and Weed", Global Potato conclave, Gandhinagar, India, January 2020.
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- Virendra Singh, Narsa R Tummuru and Bharat Singh "Integrated Battery Charger with Delta Connected BLDC Motor for Electric Vehicle Applications" IEEE PIICON conference, INDIA, 2020.
- Vishnu Prasad, Narasa Reddy Tummuru "A Phase Shift Control Strategy for Bidirectional Power Flow In Capacitive Wireless Power Transfer System Using LCLC Compensation" IEEE Conference on PESGRE 2020, INDIA.
- Akansha Garg, Narasa Reddy Tummuru and Ramesh Oruganti "Implementation of Energy Management Scenarios in a DC Microgrid using DC Bus Signaling" IEEE Conference on PESGRE 2020,INDIA.
- Sachin Chauhan, Narasa Reddy Tummuru "High frequency AC Link Based Isolated Dual Active Bridge DC-DC Converter Control, Features and Its Functionalities" IEEE Conference on PESGRE 2020,INDIA.
- Neelesh Yadav, Narasa Reddy Tummuru "Fault Detection and Isolation Technique in Low Voltage DC Microgrid Based on Terminal Resistance of DC Circuit Breakers" IEEE Conference on PESGRE 2020, INDIA.
- Bharat Vardhini, Narasa Reddy Tummuru "A Single Stage Bidirectional Wireless Power Transfer for Multiple Vehicle Charging Application" IEEE Conference on PESGRE 2020,INDIA.
- Ritwik Ghosh, Narasa Reddy Tummuru, Bharat Singh Rajpurohit "Finite Control Set Model Predictive Control for Three Level Neutral Point Clamped Inverter With Reduced Numbers of Switching State Combi-nations" ECCE 2019, USA, (Accepted).
- Bhaskara Rao, Narsa R Tummuru "Power Management and Control of Grid Connected Microgrid With Inbuilt EV Charging for Residential Homes" IEEE 5th I2CT 2019 Pune, India,2019.
- Bharat Vardhini, Narsa Reddy "Single stage inductive wireless power transfer in e-vehicle applications" IEEE TENCON, India-2019.
- Ankit Joshi, Arpan Gupta and Narsa R Tummuru"Torque vectoring differential system for hilly terrain electricvehicles" ICMPT-19 IIT Madras, India.
- A K Soni, A Mehrotra, A Joshi, A Gupta, Narsa R Tummuru "Electric bicycle with regenerative braking system" ICMPT-19 IIT Madras, India.

- Gitika Pandy, Narsa Reddy “Power Flow Study of Grid Connected Bidirectional WPT Systems for EV Application” IEEE Conference on PESGREE, India-2020.
- Priyanka, Reddy “Misalignment Tolerant Primary Controller for Series-Series Compensated Static Wireless Charging of Battery” IEEE TENCON, India-2019.
- Ritu Rai,Narsa Reddy “Circulation Power Flow Elimination Technique between source ports in TAB” IEEE Conference on PESGREE, India-2020.
- Ravi Teja, Narasa Reddy Tummuru “Three phase differential based flyback inverter for photovoltaic–grid connected applications” IEEE conference on PESGRE 2019, India.
- Ritwik Ghosh, Narasa Reddy Tummuru, Bharat Singh Rajpurohit “Virtual Inertia from Renewable Energy Sources” IEEE conference on PESGRE 2019, India.
- Ravi Kumar, Narsa Reddy, “Predictive Voltage Control of Two-Leg Current Source Inverter for UPS Applications” IEEE conference on UPCON, Nov. 2019, INDIA.
- Dr. Rameshwar Pratap Visited IEEE-ICDM, 2019 held in Beijing, China from November 8-11, 2019, and delivered a talk on the accepted paper “Efficient Sketching Algorithm for Sparse Binary Data”.
- Dr. Rameshwar Pratap Attended “Indo-German Spring School on Algorithms for Big Data” from February 10-13, 2020 held at IIIT Delhi.
- Ashish Mishra, Ankush Bag, “Dark Current Suppression in UV-Photodetector by b-Ga2O3-CuO Based Heterostructure ”, International Conference on Functional Materials-2020 (ICFM) IIT Kharagpur, India 2020.
- Manoj K Yadav, Arnab Mondal, Satinder K Sharma, Ankush Bag, “Performance Evaluation of Ga2O3 Schottky Barrier Diodes on Si (100) and Si (111) using PLD and Sputtering Techniques ”, International Workshop on Physics of Semiconductor Devices(IWPSD) Kolkata, India 2019.
- Arnab Mondal, Manoj K Yadav, Shiv Kumar, Ankush Bag, “CVD grown Ga2O3 Based Solar Blind Deep-UV Photodetectors” ,International Workshop on Physics of Semi-conductor Devices(IWPSD) Kolkata, India 2019.
- Shiv Kumar, Arnab Mondal, Manoj K Yadav, Ankush Bag, “Ohmic Characteristics Improvement of Au/Ti/-Ga2O3 through Field Emission Dominating Transport of Carriers ”, International Workshop on Physics of Semiconductor Devices (IWPSD) Kolkata, India 2019.
- I. Yadav, A. Joshi, E. Ruscino, V. Liberali, A.Andrezza, H. Shrimali, "Design of HV-CMOS Detectors in BCD Technology with Noise and Crosstalk Measurements", in the IEEE ICECS, Nov. 2019, Genova, Italy.
- S. Dhiman, I. Yadav, H. Shrimali, "Energy Efficient Bootstrapped Driver for a Particle Detector in 180 nm SOI Technology", in the Asia Pacific Conference on Circuits and Systems (APCCAS) 2019, Bangkok, Thailand.
- K. S. Pandey, Dinesh B., N. Goel, H. Shrimali , "An Ultra-Fast Parallel Prefix Adder" in the IEEE Computer Arithmetic (Arith), Kyoto, Japan, Jun. 10-12, 2019.
- S. Illikkal, J. Tripathi, H. Shrimali , "Jitter Estimation in a CMOS Tapered Buffer for an Application of Clock Distribution Network" in the IEEE APEMC, Sapporo, Japan, Jun. 3-7, 2019.
- V.K. Sharma, Dinesh B., S. Illikkal, J.N. Tripathi, N. Gupta, H. Shrimali, "Analysis of Timing Error Due to Supply and Substrate Noise in an Inverter Based High-Speed Comparator", in the IEEE ISCAS, Sapporo, Japan, May. 2019.
- Dinesh B., N. Gupta, H. Shrimali, "A 6-Bit 29.56 fJ/conv-Step, Voltage Scalable Flash-SAR Hybrid ADC in 28 nm CMOS", in the IEEE ISCAS, Sapporo, Japan, May. 2019.
- Prabhjot Kaur and Anil Kumar Sao, "Single Image based Transformation Learning and Reconstruction of High Field-Like MR Images", International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI) 2019, Shenzen, China.
- Munmun Baisantary and Anil Kumar Sao," Band Selection Using Segmented Pca And Component Loadings For Hyperspectral Image Classification",IGARSS 2019 - 2019 IEEE International Geoscience and Remote Sensing Symposium, Yokohama, Japan, 2019, pp. 3812-3815.

- Krati Gupta and Daksh Thapar and Arnav Bhavsar and Anil Kumar Sao, "Deep Metric Learning for Identification of Mitotic Patterns of HEp-2 Cell Images", IEEE Conference on Computer Vision and Pattern Recognition Workshops, CVPR Workshops 2019, June 16-20, 2019, Long Beach, CA, USA.
- Krati Gupta and Arnav Bhavsar and Anil Kumar Sao, "A CNN Based HEp-2 Specimen Image Segmentation and Identification of Mitotic Spindle Type Specimens", Computer Analysis of Images and Patterns - 18th International Conference, CAIP, September 3-5, 2019, Salerno, Italy,
- H. Tiwari and S. Thakor, "On Characterization of Entropic Vectors at the Boundary of Almost Entropic Cones," in IEEE Information Theory Workshop (ITW), Gotland, Sweden, August 2019.
- S. Thakor and M. I. Qureshi, "Undirected Unicast Network Capacity: A Partition Bound," in IEEE International Symposium on Information Theory (ISIT), pp. 196-200, Paris, France, July 2019.
- S. Alam, S. Thakor, and S. Abbas, "An Analysis of a Randomized Local Search Algorithm for the Entropy Space," 2019 4th International Conference on Information Systems and Computer Networks (ISCON), Mathura, India, 2019, pp. 330-334.
- R. Jha, G. Jaswal, A. Nigam, A. Bhavsar, S. Pathak, R. Kumar. "HLGSNet: Hierarchical and Lightweight Graph Siamese Network with Triplet Loss for fMRI-based Classification of ADHD." International Joint Conference on Neural Networks (IJCNN) 2020. (accepted).
- A. Kumar, A. Bhavsar, R. Verma. "Detecting Deepfakes with Metric Learning." International Workshop on Biometrics and Forensics (IWBF) 2020.
- A. Kumar, A. Bhavsar, R. Verma. "Syn2Real: Forgery Classification via Unsupervised Domain Adaptation." Winter Conference on Application of Computer Vision (WACV), DeepPAB Workshop 2020.
- S. Kumari, R. Jha, A. Bhavsar, A. Nigam. "'AUTODEPTH: Single image depth map estimation via residual CNN encoder-decoder and stacked hourglass." International Conference on Image Processing. (ICIP) 2019.
- K. Gupta, A. Bhavsar, A. Sao. "A CNN based HEp-2 specimen image segmentation and identification of Mitotic Spindle type specimens." International Conference on Computer Analysis of Images and Patterns, (CAIP) 2019.
- C. Sonawane, D. Pratap Singh, R. Sharma, A. Nigam, A. Bhavsar "Fabric Classification and Matching using CNN and Siamese Network for E-commerce." International Conference on Computer Analysis of Images and Patterns, (CAIP) 2019.
- R. Jha, S. Patil, A. Nigam, A. Bhavsar "FS2Net: Fiber Structural Similarity Network (FS2Net) for Rotation Invariant Brain Tractography Segmentation using Stacked LSTM based Siamese Network." International Conference on Computer Analysis of Images and Patterns, (CAIP) 2019.
- K. Gupta, A. Bhavsar, A. Sao. "Deep metric learning for identification of mitotic patterns of HEp-2 cell images." IEEE Conference on Computer Vision and Pattern Recognition, CVMI workshop (CVPRW 2019), 2019.
- V. Gupta, A. Bhavsar. "Partially-independent framework for breast cancer histopathological image classification." IEEE Conference on Computer Vision and Pattern Recognition, CVMI workshop (CVPRW 2019), 2019.
- A. Singh, P. Rajan, A. Bhavsar. "Deep hidden analysis: A statistical framework to prune feature maps." nternational Conference on Acoustics, Speech, and Signal Processing (ICASSP 2019), 2019.
- V. Gupta, A. Bhavsar. "An integrated multi-scale model for breast cancer histopathological image classification using CNN-pooling and color-texture features". European Congress on Digital Pathology (ECDP 2019), 2019.

- G. Sharma, A. Bandopadhyay, S. Roy Chowdhury, "A Preliminary Study on vascular activity with ischemic stroke rehabilitation technique", 7th Inter-national Conference on Non invasive Brain Stimulation (NIBS), Baden Baden, Germany, March 24-26, 2020.
- G. Sharma, A. Bandopadhyay, S. Roy Chowdhury, "A Preliminary Study to Classify Healthy and Lesioned Hemisphere of Ischemic Stroke Patients with Anodal Transcranial Direct Current Stimulation Technique", Deutschen Gesellschaft fur Klinische Neuro-physiologie und Funktionelle Bildgebung (DGKN 2020), Baden Baden, Germany, March 26-28, 2020.
- A. Madhubabu, L.V.R. Prasadaraju, S. Roy Chowdhury, "Classification of Abnormal and Normal Heart Sounds Using the MEMS Based High Performance PhonoCardioGraphy System", IEEE International Conference on Artificial Intelligence and Signal Processing (AISP 2020), Amravati, January 10-12, 2020, (Accepted for publication).
- Garg, P.K. Sonker, K. Shakya, D. Khurana, S. Roy Chowdhury, "Detection of Brain Stroke using Electro-encephalography (EEG)", 13th IEEE International Conference on Sensing Technology (ICST) 2017, Sydney, December 2-4, 2019.
- K. Shakya, P. Sonker, S. Roy Chowdhury, "A portable device for measuring Heart Rates in comparison with the pressure applied for light penetration in skin surface", 13th IEEE International Con-ference on Sensing Technology (ICST) 2017, Sydney, December 2-4, 2019.
- Y. Arora, S. Roy Chowdhury, "Assessing the role of electrodes for high-definition transcranial direct current stimulation configurations on cortical excitability in a computational framework", 13th Inter-national Con-ference on Complex Medical Engineering (CME 2019), Dortmund, Germany, September 23-25, 2019.
- G. Sharma, S. Roy Chowdhury, "Enhance-ment in Focality of Non-Invasive Brain Stimulation through High Definition (HD) Anodal Transcranial Direct Current Stimulation (tDCS) Techniques", 16th IEEE International Conference on Compu-tational Intelligence in Bioinformatics and Computational Biology, Certosa di Pontignano, Siena, Tuscany, Italy, July 9-11, 2019.
- G. Sharma, O. Karwal, S. Roy Chowdhury, "Non Invasive Brain Stimulation (NIBS) Study Based on Ischemic Stroke Patients", 41st Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC 2019), Berlin, Germany, July 23-27, 2019.
- Mr. Arshdeep Singh: Attended Detection and Classification of Acoustic Scenes and Events 2019 Workshop (DCASE2019), in New York University (NYU), USA and presented my research work.
- Mr. Arshdeep Singh: Attended IEEE International Conference on Acoustics, Speech and Signal Processing, ICASSP 2019 in Brighton, UK and presented my research article.
- Mr. Arshdeep Singh: Pursuing Internship in Intel, Bangalore since 4 Sep, 2019 and ending on 31 March, 2020.
- Ms. Yashika Arora: Scholar at Neuroeng-ineering and Informatics for Rehabilitation Laboratory (NIRlab), Department of Biomedical Engineering, University at Buffalo, Buffalo from September 1, 2019 to February 28, 2020 under SERB OVDF Program.
- Ms. Yashika Arora: Attended International Brain Research Organization – Asia Pacific Regional Committee School 2019 on Advanced Techniques to Explore the Functions of Normal and Diseased Brain at Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum, India from 22 April to 6 May 2019.
- Ms.Yashika Arora: Attended 2nd Biomedical Instruments and Devices Hub Workshop on Role of Biomedical Hub/Incubators in Bringing Innovation to the Healthcare System (31st May 2019) at Postgraduate Institute of Medical Education & Research, Chandigarh.

- Ms. Yashika Arora: Presented project proposals on: "Characterization of Ischemic Stroke and Hemorrhagic Stroke using Near-infrared spectro-scopy (NIRS)" and "Development of a low cost point of care testing device for detecting & localizing Traumatic Brain Injury" on June 4, 2019 under 2nd Phase Evaluation under "BID (Biomedical Instruments and Devices Hub) call for innovation" by Postgraduate Institute of Medical Education & Research, Chandigarh.
- Ms. Yashika Arora: Presentation and demonstration on "Analysis of Electro-encephalography (EEG) Signals" during Cooch Behar Panchanan Barma University Students' visit in Bio-X Centre, IIT Mandi on 17th & 18th May, 2019.
- A. Kumar and T. Jain, "Some Preliminary Results on Sub-optimal Consensus Protocol Design for Double Integrator Agents using Krotov Conditions," 2020 Advances in Control & Optimization of Dynamical Systems (ACODS) Conference, IIT Madras, India, 2020 (to appear) (Date of Conference: 16-19 Feb. 2020).
- A. Kumar and T. Jain, "Optimal Consensus Protocol Design for Scalar Single Integrators using Krotov Conditions," 2020 Advances in Control & Optimization of Dynamical Systems (ACODS) Conference, IIT Madras, India, 2020 (to appear) (Date of Conference: 16-19 Feb. 2020).
- A. Kumar and T. Jain, "Sub-optimal Control Design for Second Order Non-linear Systems using Krotov Sufficient Conditions," 2020 Advances in Control & Optimization of Dynamical Systems (ACODS) Conference, IIT Madras, India, 2020 (to appear) (Date of Conference: 16-19 Feb. 2020)
- Talk given on the paper entitled "Optimal and Sub-optimal Control Design for Second Order Nonlinear Affine Systems using Krotov Sufficient Conditions" in 4th Conference on Control and Fault Tolerant Systems (SysTol), Casablanca, Morocco, 18-20 September, 2019.
- Talk given on the paper entitled "Some Preliminary Results on Sub-optimal Consensus Protocol Design for Double Integrator Agents using Krotov Conditions" in Advances in Control & Optimization of Dynamical Systems (ACODS) Conference, IIT Madras, India, 16-19 Feb. 2020.
- Talk given on the paper entitled "Optimal Consensus Protocol Design for Scalar Single Integrators using Krotov Conditions" in Advances in Control & Optimization of Dynamical Systems (ACODS) Conference, IIT Madras, India, 16-19 Feb. 2020.
- Talk given on the paper entitled "Sub-optimal Control Design for Second Order Non-linear Systems using Krotov Sufficient Conditions" in Advances in Control & Optimization of Dynamical Systems (ACODS) Conference, IIT Madras, India, 16-19 Feb. 2020.
- Vyoma Singh, Indian Control Conference (ICC) at IIT Hyderabad (18-20 Dec, 2019).
- Vyoma Singh, Advances in Control and Optimization of Dynamical Systems (ACODS) at IIT Madras (16-19 Feb,2020).
- R. Ghosh, N. R. Tummuru, B. S. Rajpurohit, "Finite Control Set Model Predictive Control for Three Level Neutral Point Clamped Inverter With Reduced Numbers of Switching State Combinations", IEEE Energy Conversion Congress & Expo (ECCE-2019), Baltimore MD, USA,Sep-29-Oct-03, 2019.
- M. Sharma, and, B. S. Rajpurohit, "Application of PID Controller for Power Quality Improvement Under Non-Stationary Load Conditions" in Proc. 54th IEEE Industry Applications Society Annual Meeting, Maryland, USA, 2019.
- D. Panda, B. S. Rajpurohit, and, A. Monti "Synthetic Inertia for Frequency Regulation of Electric Grid using Modular-Multilevel Converter" in Proc. 54th IEEE Industry Applications Society Annual Meeting, Maryland, USA, 2019.
- R. M. Pindoriya, G. Gautam and B. S. Rajpurohit, "A Novel Application of Pseudorandom Based Technique for Acoustic Noise and Vibration Reduction of PMSM Drive",IEEE IASAM 2019, Baltimore, USA, 29 Sep. 2019- 03 Oct. 2019.

- A. Usman, N. T. Doiphode and B. S. Rajpurohit, "Stator Winding Faults investigation in Permanent Magnet Synchronous Motor using Motor Signatures: Part I," 2019 International Conference on Electrical Drives & Power Electronics (EDPE), The High Tatras, Slovakia, 2019, pp. 160-168.
- A. Usman, B. M. Joshi and B. S. Rajpurohit, "Modeling and Analysis of Demagnetization Faults in BLDC Motor using Hybrid Analytical-Numerical Approach", in IEEE 45th Annual Conference of the IEEE Industrial Electronics Society, IECON'19 October 14-17, 2019, Lisbon, Portugal, pp 1034-1039.
- A. Usman, N. T. Doiphode and B. S. Rajpurohit, "Finite Element Modeling of Stator Winding Faults in Permanent Magnet Synchronous Motor: Part II," 2019 International Conference on Electrical Drives & Power Electronics (EDPE), The High Tatras, Slovakia, 2019, pp. 169-176.
- R.M. Pindoriya, B. S. Rajpurohit, and A. Monti "An Investigative Study of the PMSG Based Wind Turbine Using Real Time Simulation", in IEEE 8th International Conference on Power System, ICPS 2019.
- A. Usman and B. S. Rajpurohit, "Numerical Analysis of Stator Inter-turn Fault and Demagnetization effect on a BLDC Motor using Electro-magnetic Signatures", IEEE International conference on Power Electronics, Smart Grid and Renewable Energy (PESGRE 2020) Cochin, Kerala, India.
- R. Ghosh, N. R. Tummuru, B. S. Rajpurohit and A. Monti, "Virtual Inertia from Renewable Energy Sources: Mathematical Representation and Control Strategy," 2020 IEEE International conference on Power Electronics, Smart Grid and Renewable Energy (PESGRE 2020) Cochin, Kerala, India.
- A. Usman and B. S. Rajpurohit, "Modeling and Analysis of Stator Inter-turn Faults in a BLDC motor using Hybrid Analytical - Numerical Approach", International Conference on Modelling, Simulation & Intelligent Computing (MoSICom 2020), Springer publication series, Lecture Notes in Electrical Engineering, Dubai, UAE, January 2020.
- V.K Sharma, A. Usman and B. S. Rajpurohit, "Demagnetization Fault Diagnosis in BLDC Motor using Low Cost Hall-Effect Sensors", International Conference on Modelling, Simulation & Intelligent Computing (MoSICom 2020), Springer publication series, Lecture Notes in Electrical Engineering, Dubai, UAE, January 2020.
- A. Usman and B. S. Rajpurohit, "Detection and Identification of Stator Inter-turn Faults and Demagnetization effects in Hybrid Analytical-Numerical model of a BLDC Motor using Electromagnetic Signatures", IEEE Texas Power and Energy Conference 2020, College Station, Texas, US, 2020.
- A. Kumar, R. M Pindoriya, B. S. Rajpurohit, "Design and Imple-mentation of Rotor Position Estimation Scheme for PMSM Drive" IEEE Power India International Conference (PIICON-2020), Murthal, Haryana, February 2020.
- V. Singh, N. R. Tummuru, B. S. Rajpurohit, "Integrated Battery Charger with Delta Connected BLDC Motor for Electric Vehicle Applications", IEEE Power India International Conference (PIICON-2020), Murthal, Haryana, February 2020.
- V. Srivastava, B. S. Rajpurohit, M. Kaur, "Investigation of Factors Affecting Nano-dielectric Strength Under High Voltage Stress Using Finite Element Method", IEEE Power India International Conference (PIICON-2020), Murthal, Haryana, February 2020.
- S. Kumar, B. S. Rajpurohit, "Compre-hensive Review on Fault Tolerance Capability of Power Converters for DC Microgrid", IEEE Power India International Conference (PIICON-2020), Murthal, Haryana, February 2020.
- A. Sharma, B. S. Rajpurohit, "Maximum Versoria Criteria Based Adaptive Filter Algorithm for Power Quality Intensification" IEEE Power India International Conference (PIICON - 2020),Murthal, Haryana, February 2020.

- A. Usman, B. S. Rajpurohit, "Design and Control of a BLDC Motor Drive Using Hybrid Modeling Technique and FPGA Based Hysteresis Current Controller" IEEE Power India International Conference (PIICON-2020), Murthal, Haryana, February 2020.
- R. Dogra, B. S. Rajpurohit, "Sign Regressor LMS Algorithm Based Adaptive Control Algorithm for Multi-objective Solar PV Generator System Connected to Grid", IEEE Power India International Conference (PIICON-2020), Murthal, Haryana, February 2020.
- Adil Usman, V. K. Sharma, B. S. Rajpurohit, "Harmonic Analysis of a BLDC Motor Under Demagnetization Fault Conditions" IEEE Power India International Conference (PIICON-2020), Murthal, Haryana, February 2020.
- G Dorji, J. Zangpo, R. M. Pindoriya, B. S. Rajpurohit, "A Case Study on Power Quality Analysis for 600 kW Grid Connected Wind Farm", IEEE Power India International Conference (PIICON-2020), Murthal, Haryana, February 2020.
- V. Srivastava, B. S. Rajpurohit, M. Kaur, "Numerical Analysis on Factors Affecting Hydrophobicity and Icephobicity of the High Voltage Insulator", IEEE Power India International Conference (PIICON-2020), Murthal, Haryana, February 2020.

Outreach/Continuing Education Activities Organized

- Dr. Srikant Srinivasan has conducted 5 day Faculty development program for faculty of IIT Una on July 8-12, 2019.

- Dr. Srikant Srinivasan has conducted Exploring Engineering session for Induction programme 1st year undergraduate students at IIIT Una campus on 27th August 2019.

- Dr. Shubhajit Roy Chowdhury has participated and trained teachers of IIIT Una in the week long Faculty Development Workshop during July 2019. Developed lab manuals, instruction guides and disseminated the same during the workshop.
- Dr. Srikant Srinivasan has conducted Farmer education workshops in Lahaul area of Himachal Pradesh in July 2019.

- Dr. Srikant has conducted farmer training sessions in Gandhinagar, Gujarat in Jan 2020 to educate them on the use of online tools for improved farming practices.
- Outreach activites for School childrens by SCEE Labs.

Name of School	No. of Students	Class	Date of Visit
GSSS Ghasnu Distt. Mandi (H.P)	58	9th and 10th	16.01.2020
GSSS Harnora Teh. Sadar Distt.Bilaspur (H.P)	35	10 and +1	28.11.2019
GSSS Kapahi Distt. Mandi (H.P)	31	9th and 10th	10.01.2020
GSSS Sidhyani Distt Mandi (H.P)	30	9th and 10th	04.12.2019
GDC Lad Bharol Distt. Mandi (H.P)	20	B.Sc. and B.A. 1st year	10.12.2019

The above school visited IIT Mandi SCEE labs and we have shown them the basic electronics components such as resistor capacitor diode and transistor. Also we have demonstrated basic measuring instruments such as Multimeter,CRO and Power supplies.

Dr. Gopi Shrikanth Reddy delivered a lecture on Fibre Optic Communication and demonstrated some instrument of fibre optic communication.

- **IEEE Talk with Sandeep Jain, founder Geeks for Geeks!!**

An IEEE Student Branch Chapter IIT Mandi conducted IEEE talk on *"Geeks for Geeks"* in association with IEEE PES-IAS-PELS Delhi Section on 12th April 2019, at 10: 00 am to 12: 30 pm in A1- NKN Conference room at IIT Mandi, Mandi, H.P, India. The IEEE talk was in collaboration with the Techno-Cultural Fest of IIT Mandi named *Exodia* '19. The talk was also co-sponsored by the IEEE Student Professional Awareness Activity (SPAA) Committee, IEEE MGA SPAA.

About the speaker: Mr. Sandeep Jain, the founder of Geeks for Geeks!!'.

Sandeep Jain is an IIT Roorkee alumnus and founder of 'Geeks for Geeks'. He loves to solve programming problems in most efficient ways. Apart from Geeks for Geeks, he has worked with DE Shaw and Co. as a software developer and JIIT Noida as an assistant professor.


- **IEEE IIT Mandi "Robowar"**

IEEE Student Branch Chapter IIT Mandi in collaboration with Robotics club of IIT Mandi organized a *"Robowar"* as a part of the Techno-Cultural fest of IIT Mandi named Exodia'19. This was conducted on 13th April 2019 in IIT Mandi in collaboration with IEEE PES-IAS-PELS Delhi Section. The vibrant and enthusiasm of the students made the events successful. The undergraduate and graduate students showcased their robotics talent through the invention of robots to fight with the other robot(s). The activity had a task and objectives as defined below:

Task:

Task was to design and construct a wired or wireless (remote controlled) robot capable of fighting a tournament against other bot(s). Each team has to come up with a CAD model of a robot. With mighty armours, nifty axes and more innovative weapons.


- **IEEE Project for Kids: Renewable Energy for Future**

IEEE SB Chapter IIT Mandi in collaboration with IEEE PES-IAS-PELS Delhi Section successfully implemented project for kids in Himalayan Region on 20th April 2019 through a painting competition with a theme of "*Renewable Energy for Future*" conducted at Government School named Kamand Govt. School.

The project focused on creating awareness among the kids about renewable energy and it's sources and create a collaborative colouring book, where each page and design educated the kids about Power and Energy and inspire and teach renewable energy to them.

Altogether, 32 kids from 4 to 10 years old, took part in this competition with unparalleled excitement and enthusiasm. Students from standard 4th, 5th and 6th participated in the event. The team

provided colours, drawing sheets, pencils, sharpeners, erasers and ruler and other required stationery to kids for drawing.

Participants were judged based on their colouring skills, vision and creativity. At the end, best 10 (out of Ten, three prizes for 1st, 2nd and 3rd number and other Seven are consolation prizes) were given prizes. Prof. Ravindra Arora, *Life Fellow, IEEE* was the special guest and judge of the event. Engineering"

- **Second IEEE PES Day Celebration**

On the occasion of IEEE PES on 22nd April 2019 , IEEE Student Branch Chapter IIT Mandi in collaboration with IEEE PES-IAS-PELS Delhi Section conducted an expert talk on "***Solving Mystery of Bijli Mahadav***" on 22nd April 2019.

The talk was given by Prof. Ravindra Arora Life Fellow, IEEE and the author of the book titled "High Voltage Insulation Engineering" published by IEEE Press.

Dr. Ravindra Arora, Professor Dr.-Ing. (Technical University, Dresden, Germany). Dr. Ravindra Arora obtained his Doctor- Ingenieur degree in Electrical Engineering from Technical University, Dresden, Germany in 1973.

Overall Agenda of the event is as follows:

1. Introduction to IEEE PES/PELS Day by Rajesh Pindoriya, PES/PELS Day Ambassador.
2. Brief Progress of IEEE SB Chapter IIT Mandi, by Adil Usman, PES Young Professional Representative, India.
3. Expert talk on 'Solving Mystery of Bijli Mahadev, Kullu' by Prof. Ravindra Arora, Life Fellow, IEEE.
4. Vote of Thanks by Piyush Anand, IEEE SB Chapter Chair.

The event was followed by the Cake Cutting celebrating the 2nd IEEE PES Day.


- **IEEE Technical talk on Artificial Intelligence for Automated Driving**

An IEEE technical talks was organized by IEEE Student Branch Chapter IIT Mandi in collaboration with IEEE PES-IAS Chapter Delhi Section on 14th May 2019 on the topic “Artificial Intelligence for Automated Driving” and “Natural Language Processing” by Continental Pvt. Ltd. Bangalore, India.

People around the World are now quite excited about the launch of autonomous cars. The ability to perceive its environment using the modern form of AI and take decisions without the assistance of any driver is amazing. In other words, these cars are equipped with special sensors, processors and another database which is responsible for the operation of this carand doesn't require any driver. It navigates itself following up to the destination point requested by users. The tech talk gives the brief of Continental's view of Autonomous Driving and Its current progress in the field. ***Speaker***: Bharath Shivapuram


- **Hackathon on Deep Learning**

IIT Mandi in collaboration with IEEE IAS SB Chapter IIT Mandi has organized a hackathon from 17th May 2019 to 19th May 2019 at IIT Mandi, Himachal Pradesh, India. There were 23 teams who have participated in the hackathon and showcased their skills. All of the projects were chosen as to motivate the students on the wide applications that the current trend of deep learning provides and make them familiar with many aspects of deep learning. Each group were assisted by the faculty in charge Dr. Aditya Nigam and teaching assistants of the Deep Learning course offered in IIT Mandi.

- **Industrial Visit to Bijni Power Substation (132/33 kV)**

IEEE SB Chapter IIT Mandi in collaboration with IEEE PES-IAS-PELS Delhi Section, organized IEEE Industrial visit to ***Bijni Power Substation (132/32 kV)***, Mandi, Himachal Pradesh, India on 25th May 2019.

Around 22 students comprising of undergraduate, graduate and PhD research students of IIT Mandi had an academic visit to ***Bijni Power Substation (132/33 kV)*** in Mandi, Himachal Pradesh, India, on 25th May 2019.

Students had an opportunity to see the transmission and distribution power in Bijni Power substation. Students became practically aware of the theories which they studied in their curriculum. The Engineers at the station expose us to many of the relevant terminologies and systems which were actually new to the students to see them first time in practical. The Control labs were the part of Data Acquisition Systems to which students became familiar with and could observe and record every second data of the complete system.

- **IEEE Industrial Visit to Larji Hydro Power Plant (126 MW)**

IEEE SB Chapter IIT Mandi in collaboration with IEEE PES-IAS-PELS Delhi Section, organized IEEE Industrial visit to Larji Hydro Power Plant (126 MW) in Mandi, Himachal Pradesh, India, on 25th May 2019. The 126 MW Larji Hydropower Plant near Aut on the main stem of the Beas is run by the Himachal Pradesh State Electricity Board (HPSEB).

Around 22 students comprising of undergraduate, graduate and PhD research students of IIT Mandi had an academic visit to Larji Hydro Power Plant (126 MW) in Mandi, Himachal Pradesh, India, on 25th May 2019.

Students had an opportunity to see the Hydro Power Plant Generation system at the venue. Students became practically aware of the theories which they studied in their curriculum. The Engineers at the station expose us to many of the relevant terminologies and systems which were actually new to the students to see them first time in practical. The SCADA and Control labs were the part of Data Acquisition Systems to which students became familiar with and could observe and record every second data of the complete system.

- **A National Workshop on Real-Time Digital Simulation for Power Engineering Applications.**

IEEE Student Branch Chapter IIT Mandi in collaboration with IEEE IAS SB Chapter of IIT Mandi organized a national workshop on “Real-Time Digital Simulation for Power Engineering

Applications", 13-16 June 2019 at IIT Mandi. This workshop was partially sponsored by IEEE IAS and Science and Engineering Research Board (SERB), India. The workshop's objective was to enhance the knowledge of the participants in the area of the "Real-Time Digital Simulation for Power Engineering Applications". With the theme of "Real-Time Digital Simulation for Power Engineering Applications," this event was providing an environment for research scholars, faculty members and industry personnel to know, grow, develop, experience and exchange their ideas to fortifying the technological developments. Modern power systems are progressing towards the cutting-edge technology which demands the whole new ideas in operations, power management/utilization and this makes the real time simulators inevitable. So flexible, scalable, fast and practical ground based real time digital system is the key requirement of the present electrical power systems. Here at IIT Mandi, we usually carry out our complex and critical research works fluently with such state-of-the-art real time digital simulator system. The drive of this workshop is to provide on acquaintance to the participants in the direction of real-time digital simulation used for power engineering and industrial applications. Our motive is to deliver latest and best-in-class procedural training to participants. This program was including lecture sessions, discussions on research issues by the participants, poster presentation and most importantly an intensive hands-on training on state-of-the-art digital simulators which are available in the power engineering laboratory of IIT Mandi.

- **IEEE Technical talk on Applying Gandhian Principles for Energy Sustainability and Mitigating Climate Change.**

An IEEE technical talks was organized by IEEE IAS Student Branch Chapter IIT Mandi in collaboration with IEEE PES-IAS Chapter Delhi Section on 18th July 2019 on the topic "Applying Gandhian Principles for Energy Sustainability and Mitigating Climate Change" by Prof. Chetan Singh Solanki.

Prof. Chetan Singh Solanki, IIT Bombay has undertaken Gandhi Global Solar Yatra (GGSY), to promote the idea of Energy Swaraj, wherein the communities generate and consume their own energy needs through the adoption of solar energy. With this, he is traveling across the country and visited Mandi on 18th July 2019, and he delivered IEEE technical talk on *"Applying Gandhian Principles for Energy Sustainability and Mitigating Climate Change"*.

- **Celebration of Teacher's Day 2019.**

On the occasion of Teacher's day, the IEEE IAS Student Branch Chapter IIT Mandi with collaboration with IEEE PELS Student Branch Chapter IIT Mandi celebrated Teacher's day on 5th September 2019 at IIT Mandi, Himachal Pradesh, India. Teachers' Day in India is celebrated on 5th September to commemorate the birth anniversary of Dr. Sarvepalli Radhakrishnan. He was a renowned scholar, recipient of Bharat Ratna, first Vice-President and second President of independent India. He was born on 5th September 1888. As an educationist, he was an advocate of edification, and was a distinguished envoy, academician, and above all a great teacher. As the common adage goes, the future of a country lies in the hands of its children and teachers, as mentors, can would students into future leaders who shape the destiny of India. They play an important role in our lives to become successful in career and business. They help us to become a good human being, a better member of the society and an ideal citizen of the country. Teacher's Day is celebrated to acknowledge the challenges, hardships and the special role that teachers play in our lives.

- IEEE Lecture: "Different sources of power generation" by Prof. Ravindra Arora who is retired faculty from department of Electrical Energy at IIT Kanpur. High Voltage and Insulation Engineering are his main fields of interest.

- **IEEE Lecture: "Anthropogenic Climate Change" by Prof. Ramesh Oruganti.**

Prof. Ramesh Oruganti delivered a talk on manmade climate change and its advance effect. He also suggested the advantages of renewable energy sources. Prof. Oruganti is a Visiting Professor, IIT Mandi, January 29th, 2013 to onwards; Associate Professor/Senior Lecturer, NUS, Singapore (1989-2010); Senior Visiting Fellow, UNSW, Australia (July 2007 to May 2008); R&D Engineer, Corporate R&D, Schenectady, USA (1987-89).

- **IEEE Lecture: High Performance and Energy Efficient Matrix Converter for Interfacing Battery Energy Storage System with Utility-grid.**

Prof. Sanjib Kumar Panda has presented a technical talk titled “High Performance and Energy Efficient Matrix Converter for Interfacing Battery Energy Storage System with Utility-grid”. Prof. emphasized on the opportunities in adoption of renewable energy for sustainable development of society. He also addressed the number of problems related to energy quality, energy storage, and control. By promoting research scope in Power Converters to the addressee of IIT Mandi he said power electronic converters can provide a solution to these problems thus, has significant research scope.


- **IEEE Lecture: Estimation of Grid Harmonics in the Presence of Renewable Energy Sources.**

Prof. Singh was a Chairman, IEEE UP Section for 2013 & 2014 and presently he is IEEE Region 10 (Asia-Pacific) Conference & Technical Seminar Coordinator 2015-2018. Prof Singh is also an IEEE India Council Chairman 2019 and R 10 Vice-Chair, Technical Activities 2019 of IEEE, the largest professional body in Engg. Dr. Singh is Fellows if IEEE (US), IET (UK), INAE, IE (I), IETE.


- **IEEE Lecture: Future of Renewable Energy**

Prof. Ravindra Arora is a retired faculty from department of Electrical Energy at IIT Kanpur. Prof Arora has expertise in High voltage engineering. He has many contributions in the regulations of renewable storage. This IEEE lecture was scheduled at the felicitation of the Raspberry Pi workshop on March 8th, 2020.


- **Quadcopter Workshop**

A 2 days long quadcopter workshop was organized by IEEE IAS SB Chapter IIT Mandi in collaboration with SkyFi Labs, sponsored by IEEE student branch chapter IIT Mandi and IEEE IAS-PES chapter of Delhi Section. It was conducted on 16th and 17th November 2019. Initial lecture session of 3 hrs duration helped to get a good understanding of rotary-wing aircraft and their dynamics. Students were then divided into a team of 5 members and they worked in

cooperation to build the drone. Workshop saw good participation from 1st year and 2nd year students engaging in fabricating the quadcopter and assembling electronics. It gave an exposure to Design and concepts of Embedded Systems behind multi-copper. At the last, calibration and proper testing of the developed quadcopter was done and each student was given a chance to fly their built drones in testing ground. Twenty two students have participated in the workshop.

- **Workshop on Raspberry Pi**

The IEEE PELS SB Chapter, IIT Mandi organizes two days' workshop on Raspberry Pi on March 7-8th, 2020. The scheduled workshop delivered by an industry expert, that included a short session on Linux OS and Python followed by significant hands-on sessions. The workshop has covered basic to advance level concepts on the Raspberry Pi development board though the application in the Internet of Things (IoT) and Home automation.

- **A Research Talk on "Big Data to Small Technology: Design & Automation Challenges"**

IIT Mandi in collaboration with IEEE IAS SB Chapter IIT Mandi and IEEE IAS-PES Delhi Section has organized a research talk on 'Big Data to Small Technology: Design & Automation Challenges' on 11th Feb, 2020. This talk by given by Prof. Anupam Chattopadhyay from NTU, Singapore. Dr. Anupam Chattopadhyay (Associate Professor) from NTU, Singapore, visited IIT-Mandi from 10th - 13th February 2020. Some of his current research areas are in the fields of bio-inspired cyber security, cloud-enhanced learning for hardware-oriented labs, ensuring data security for autonomous vehicle, etc.


- **IEEE Lecture : The Art and Science of Cryptography**

IIT Mandi in collaboration with IEEE IAS SB Chapter IIT Mandi and IEEE IAS-PES Delhi Section has organized a research talk on "The Art and Science of Cryptography on 12th March, 2020. The talk shall be given by an eminent teacher Dr. Gagan Garg, DA-IICT, Gandhinagar.

Brief about the Speaker:

Dr. Gagan grew up in Karnal, a town famous for Basmati rice, NDRI and Kalpana Chawla. He is the first student from Karnal to clear the IIT-JEE. He was in the first batch of students at IIT Delhi who got the degree of Five-Years Integrated M. Tech in Mathematics and Computing in 2001. Gagan topped his class (of 23) in the 7th semester with a SGPA of 9.47 on a 10-point scale. After IITD, he joined a startup called Evalueserve in Gurgaon and helped build it up from scratch. While at Evalueserve, Gagan lead teams that worked on projects on Intellectual Property Asset Management, Patent Portfolio Valuation and Patent Infringement Analysis for Fortune 100 companies.


- **Hands-on Workshop on Solar Powered Lamp for School Students**

IEEE SB Chapter IIT Mandi in collaboration with IEEE PES-IAS Delhi Section, National Service Scheme (NSS) and Society for collaborative Research and Innovation (SCRI) successfully celebrated the IEEE Day in Himalayan Region through "Hands-on Workshop on Solar Powered Lamp for School Students" with a theme of Solar Energy for Future conducted at Government School named Nishu Govt. School on 31st October 2019. This project was a part of the Global IEEE day Celebration by IEEE SB Chapter IIT Mandi and IEEE Delhi Section, NSS and SCRI.

The activity is to deliver a talk on non-renewable and renewable energy sources, after the awareness talk, there would a small hands-on session on assembling a portable solar lamp. The students of Nishu Govt. school showed high interest in making the solar lamp and the complete solar lamp has been majorly made by students itself. Though, the IEEE volunteers helped them as per their individual need. Once the students have completed the task then the solar lamp has been handed over to them as a memento and further awareness about how the solar lamp generate energy from the solar. The project focused on creating awareness among the 17th Standard students about renewable energy and its sources and assembling a portable solar lamp by each student. Altogether, 17 kids from 10th class with the four faculty members from the school participated in this event.


- **Do it Yourself Workshop on Solar Lamp**

IEEE SB Chapter IIT Mandi in collaboration with IEEE PES-IAS Delhi Section, National Service Scheme (NSS) and Society for collaborative Research and Innovation (SCRI) successfully celebrated the IEEE Day in Himalayan Region through "Do it Yourself Workshop on Solar Lamp" with a theme of Solar Energy for Future conducted at Government School named Nalan Govt. School. This project was a part of the Global IEEE day Celebration by IEEE SB Chapter IIT Mandi and IEEE Delhi Section, NSS and SCRI.

The activity is to deliver a talk on non-renewable and renewable energy sources, after the awareness talk, there would a small hands-on session on assembling a portable solar lamp. The students of Nalan Govt. school showed high interest in making the solar lamp and the complete solar lamp has been majorly made by students itself. Though, the IEEE volunteers helped them as per their individual need. Once the students have completed the task then the solar lamp has been hand over to them as a memento and further awareness about how the solar lamp generate energy from the solar. The project focused on creating awareness among the 10th Standard students about renewable energy and its sources and assembling a portable solar lamp by each student. Altogether, 15 kids from 10th class with the four faculty members from the school participated in this event.




Conferences/Workshops/Other Industry Visited (India or Abroad) or Invited Lectures Delivered

- Dr. Arnav Bhavsar has develiverd Invited talks on deep learning and applications at:
- SVNIT Surat, Gujarat, NIT Hamirpur and Sarvajanik College of Engg. and Technology Surat, Gujarat.
- Dr. Gopi Shrikant Reddy has organized two Day LabVIEW Tutorial by National Instruments.
- Dr. Renu Rameshan has served as an External examiner for comprehensive exam of Kerala Technical University.
- Dr. Tushar Jain has served as Program Chair, International Conference on Differential Equations and Control Problems: Modeling, Analysis and Computations (ICDECP19), IIT Mandi, 17-19 June, 2019.
- Dr. Tushar Jain has served as IPC Member in 4th International Conference on Control and Fault-Tolerant Systems (SysTol'19), September 18-20th, 2019 - Casablanca, Morocco.
- Dr. Srikant has participated in a faculty interaction session with DAIICT, Gandhinagar faculty on undergraduate curriculum and collaborative opportunities between IIT Mandi and DAIICT in Jan 2020.
- Dr. Narsa Reddy Tummru:
  - Visited one of the conference at NARA, Japan that had been related to power electronics and its applications: This conference gave an exposure to real time power electronic systems and their control methodology.
  - Visited Shizuoka University, Hamamatsu campus and had discussions with few professors in power engineering area about various research opportunities and also made tour to some of their well-established laboratories.
  - Visit to University of Tokyo, Kashiwa campus to explore the research possibilities on wireless power transfer in e-transportation applications.

- Dr. Padmanabhan Rajan has delivered Lecture on "Machine Learning for Bioacoustics" in Colloquium on ML with Signal Processing for Data Analytics, IEEE Kerala Section, Cochin University of Science and Technology, Nov 2019.
- Dr. Ankush Bag has visited National Central University, Taiwan from 7th Dec to 14th Dec 2019.
- Dr. Hitesh Shrimali has visitied:
  - IEEE APEMC at Sapporo, Japan (June 2019).
  - IEEE Arith at Kyoto, Japan (June 2019).
  - IEEE ICECS at Genova, Italy (Nov. 2019).
  - MOSICOM at Dubai, UAE (I was a session chair for the session: Analog Circuits) in Jan. 2020.
- Dr. Varun Dutt has delivered a guest lecture at the HPSDMA workshop.
- Dr. Varun Dutt delivered a guest lecture at the 11th International Conference on Intelligent Human-Computer Interaction at Indian Institute of Information Technology, Allahabad on 13/12/2019.
- Dr. Tushar Jain has delivered expert lecture on "Model-based Predictive Control" at Atal Bihari Vajpayee Govt Institute of Engineering & Technology, October 3-4, 2019, Shimla.

- Dr. Satinder Sharma has delivered an Invited Talk: National Seminar on Semiconductor Technology for Space and Defense Applications In technical collaboration with IEEE Chandigarh Subsection and ISSE Chandigarh Chapter Supported by: Technical Education Quality Improvement Programme (TEQIP)-III.
- Dr. Satinder Sharma has participated as a representative from IIT Mandi: startup Hub, initiative Ministry of Electronics & IT (MeitY) Electronics Niketan 6, CGO Complex, New Delhi.
- Dr. Satinder Sharma has participated and made presentation in Proc. SPIE 11326, Advances in Patterning Materials and Processes XXXVII, 113261C (23 March 2020); San Jose, CA , USA.
- Dr. Satinder Sharma has participated and made presentation in Poster Presentation: SPIE 11326, Advances in Patterning Materials and Processes XXXVII, 113261C (23 March 2020), San Jose, CA , USA.
- Dr. Satinder Sharma has participated and made presentation in Elena 2019 Conference. Imec, Kapeldreef 75 I 3001 Leuven I Belgium.
- Dr. Satinder Sharma has participated and made presentation in Oral Presentation, Elena 2019 Conference. Imec, Kapeldreef 75 I 3001 Leuven I Belgium.
- Dr. Satyajit Thakor presented research work at IEEE International Symposium on Information Theory (ISIT), Paris, France (July 2019) and at IEEE Information Theory Workshop (ITW), Gotland, Sweden (August 2019).
- Dr. Satyajit Thakor chaired a session at Bombay Information Theory Seminar 2020 (BITS, January 2020) held at TIFR and IIT Bombay. Dr. Satyajit Thakor and PhD scholars Sultan Alam, Dauood Saleem, and Ishtiyaq Qureshi also presented three posters at BITS 2020.
- Dr. Shubhajit Roy Chowdhury attended 41st IEEE Engineering in Medicine and Biology Conference held at Berlin, Germany during July 23-27, 2019. Presented a paper, chaired a session on Biomedical circuits and systems, attended IEEE Engineering in Medicine and Biology Society (EMBS) editors' meeting, attended the meeting IEEE EMBS working group on wearable medical devices.
- Dr. SRC has delivered a talk titled "Health Care: Can we have it at home?" at the Department of Electrical Engineering, University at Buffalo, USA on January 29, 2020.
- Dr. Shubhajit Roy Chowdhury is serving Associate Editor of IEEE Journal of Translational Engineering in Health and Medicine, IEEE Access Journal and Journal of Medical Systems.
- Dr. Shubhajit Roy Chowdhury chaired a session on Biomedical Circuits and Systems at IEEE EMBC 2019
- Dr. Rameshwar Pratap is serving as a Programme Committee member of "The European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases" (ECML-PKDD) (core ranked A conference) 2020.
- Dr. Rameshwar Pratap is organising a special session on "Feature Extraction and Learning on

Image and Text Data" to be held in conjunction with the conference "IEEE International Conference on Systems, Man and Cybernetics (SMC)-2020" with Mukesh Prasad, Rajiv Ratn Shah, Weiping Ding, Javier Andreu-Perez, Guandong Xu.

- Dr. Rameshwar Pratap served as a Programme Committee member of "The Sixth IEEE International Conference on Multimedia Big Data" (IEEE-BigMM),2020 New Delhi.
- Dr. Rameshwar Pratap Co-chaired (with Amit Sangroya TCS Research) IEEE BigMM'20 Grand Challenge which is to be held in conjunction with the The Sixth IEEE International Conference on Multimedia Big Data" (IEEE-BigMM), 2020 New Delhi.
- Dr. Gopi Shrikant Reddy has delivered an Invited Talk- IEEE-MTTs: IIIT-DM (Institute of National Importance) Jabalpur, Madhya Pradesh: DEC 2019.
- Dr. Gopi Shrikant Reddy has devliverd Invited Talk- Govt. Engineering college Sundernagar, Himachal Paradesh, April 2019.


Eminent Guest/Scholars/Students/ Interns Hosted

- Dr. Navneet Gupta from Minima Processor, Espoo, Finland.
- Mr. Shashank Kumar from Julich Forschungcentrum, Julich, Germany.
- Dr. Sergei Obiedkov (National Research University HSE Moscow): Oct 25 – Nov 11, 2019.
- Dr. Aleksey Buzmakov (National Research University HSE PERM): Oct 18 – Nov 1, 2019.

- Dr. Sushil Chandra, Scientist 'G' and HOD, Department of Biomedical Engineering at INMAS, DRDO visited the lab on 14/04/2019.
- Dr. Ravinder Singh from NDMA visited the lab.
- A team of scientists from DTRL DRDO visited the lab for reviewing the landslide monitoring project.
- Hannes Funk, PhD Scholrar, Institute of Semiconducting Engineering (IHT), University of Stuttgart, Stuttgart Germany.

- David Weisshaupt, PhD Scholrar, Institute of Semiconducting Engineering (IHT), University of Stuttgart, Stuttgart Germany.
- Mr. Gom Dorji, Assistant Professor at College of Science and Technology, Phuentsholing, Bhutan, visited IIT Mandi during Dec 13th 2019-March 30th, 2020.

Professional Achievements, Honors and Awards/Membership of Professional Societies

- Dr. Narsa Reddy Tummuru elevated to the grade of IEEE Senior member in the year 2020.
- Dr. Narsa Reddy Tummuru invited to serve as an Associate Editor, IEEE Access Journal from November 2019.
- Dr. Narsa Reddy Tummuru received JSPS Fellowship award 2019: Indo-Japanese Joint Project on "Establishment of Young Researcher Fellowship Programme 2019".
- Dr. Tushar Jain received best paper award in IFAC 2020 Advances in Control & Optimization of Dynamical Systems, IIT Madras, 2020.
- Dr. Varun Dutt was selected as a member of the editorial board of Management and Business Review (MBR) journal.
- Dr. Varun Dutt was selected as an Associate Editor to the Frontiers in Cognitive Science Journal.
- Dr. Varun Dutt was selected as an Editor for the special issue on “Human decision-making in combat situations involving traditional and immersive technologies” in Frontiers in Cognitive Science Journal.
- Dr. Varun Dutt was selected as a member of editorial board in Journal on Cyber Situational awareness.
- Dr. Varun Dutt is also a founder and director of Intiot Services Pvt. Ltd., India.
- Dr. Varun Dutt was selected as a member of the board of governors, RxDataScience Inc., USA.
- Dr. Shubhajit Roy Chowdhury has served as Visiting Associate Professor, Department of Biomedical Engineering, University at Buffalo during January-February 2020.
- Dr. Shubhajit Roy Chowdhury has served as a member of review committee for Gandhian Young Technological Innovator Award.
- Dr. Shubhajit Roy Chowdhury has served as a member of IEEE Working Group on Wearable medical devices of Engineering in Medicine and Biology Society.
- Dr. Shubhajit Roy Chowdhury has served as a member of DST Biomedical Devices Hub, PGIMER Chandigarh.
- Dr. Shubhajit Roy Chowdhury is External Member, Board of Academics, Department of Electronics and Instrumentation, Andhra University, Vishakhapatnam.
- Dr. Aditya Nigam received Teaching Honour Roll award on the occasion of teacher’s day 2019.
- Dr. Satinder Sharma received appreciation from IIT Mandi on foundation day for setup state of the art world class clean room facility: Centre for Design and Fabrication of Electronic Devices (C4DFED), IIT Mandi (2020).
- Dr. Anil Sao received appreciation from IIT Mandi on foundation day for successful steering the Office Automation System (OAS) Project.
- Dr. Srikant Srinivasan received appreciation from IIT Mandi on foundation day for contributions to Inst. core courses and promotopn of 5WIP at other educational institutes.

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

1. Dr. Satinder Sharma has contrunuted imesnely in setiing-up of new high end instruments and process protocols at C4DFED facility. Also setting up packaging lab at C4DFED facility.
2. Dr. Sriram Kailasm has contributed in setup of Inst. PC lab in A10 bldg. North Campus
3. Dr. Srikant Srinivasan has Created an IoT enabled Smart Farm infrastructure at IIT Mandi.

4. Dr. Padmanabhan Rajan has contributed in Setup of CodeRunner, Moodle-based tool for automatic grading of programming assignments/exams. This is used extensively in Data Science 1 and 2 courses for B.Tech. students, as well as in other courses.
5. Dr. Gopi Shrikant Reddy has contributed in eEstablished RF and Microwave testing facility, with following Equipment:
   - Far-Field Testing range for RF circuits
   - UWB testing antennas
   - Wet etching facility for circuit design with UV
   - PNA series Network analyzer: 300 kHz till 20 Ghz
6. Dr. Varun Dutt has Intiot Services Pvt Ltd. A faculty-led start up started operating from April 2019.
7. Dr. Shubhajit Roy Chowdhury has contributed in developing Embedded Systems Lab procuring state of the art equipments. Iincluding experiments on ARM Cortex Embedded Systems Platform, Mixed signal embedded systems on Field Programmable Analog Array (FPAA) based on Anadigm FPAA kits, which is very new in the field of teaching Embedded Systems in India. Also the earlier FPGA based experiments on Nexsys 2 boards are suitably adapted to newly procured ZyncUltrasparc boards.

8. Control System Lab. has procured following items: Dr. Tushar Jain, Lab. in-Charge:

Sr. No	List of equipment	Qty.
1.	LCR meter	1
2.	Digital Multimeter	15
3.	IC Tester Analog	1
4.	IC Tester Digital	1
5.	DSO 70MHz	10
6.	NI Elvis II+	10
7.	AnadigmQuardpex Development Board	10

9. Basic Electronics Lab. has procured following items: Dr. Ankush Bag, Lab. in-Charge:

Sr. No.	Name of equipments	Quantities (No's)
1	Digital Storgae Oscilloscope (70MHz)	13
2	DC Power Supply (3 Channel)	13
3	Function Generator(60MHz)	13

10. Basic Electrical Lab. has procured following items: Dr. Himanshu Misra:

Sr. No.	Name of equipments	Quantities (No's)
1	DC Power Supply	7
2	Digital Storage Oscilloscope	4
3	Single Phase Transformer	5
4	Three Phase Auto Transformer	10
5	Three phase Squirrel cage Induction Motor	4
6	Three Phase Slip Ring Induction Motor	1
7	PMSM coupled with PMSM Gen set. (2HP)	1
8	Induction coupled with PMSM Gen Set.(2HP)	1
9	Moving Iron AC/DC Voltmeter & Wattmeter & Ammeter	142
10	Rheostat	60

11. Power Electronics Lab. has procured following items: Dr. Narsa Reddy, Lab. in-Charge:

Sr. No.	Name of Equipment	Quantity (No's)
1	Digital Storage Oscilloscope	9
2	DC Power Supply	3
3	Phase Sequence Indicator	1
4	Mulitmeter (Model 17B+) (Fluke)	6
5	Semikron Inverter	4
6	Differential Probe	6

7	High Voltage Probes	2
8	Single Output DC power Supply	7
9	eZdsp F28335 board with code composer studio DSK tools and power supply	4
10	Development board TMS32DC200 Explorer kit TMDSPREX28335	10
11	Multimeter (Model 179) (Fluke)	5
12	TMS320F28335 Based DSP TRAINER KITS(Micro - 28335)	3
13	Cosel Power Supply	20
14	Desktop	4
15	TES 132 Solar power meter (Data logging)	1

12. Communication Systems Lab. has procured following items: Dr. Gopi Shrikanth , Lab. in-Charge:

Sr. No	List of Equipments	Qty.
1	USRP 2921	8
2	USRP 2954	2

13. Student Activities/Achievements:

- Mr. Rajesh Pindoriya received Continued outstanding performance student branch chapter award in 2019 at IEEE IAS Annual Meeting Baltimore.
- Ms. Jhalak Chaudhary, Mr. Utkarsh Jain and Mr. Neeraj Sharma, 2nd year UG students, received 2nd Prize in IEEE IAS Web Designing Contest in 2019 at IEEE IAS Annual Meeting Baltimore.

- Mr. Adil Usman received Outstanding student branch chapter chair award in 2019 at IEEE IAS Annual Meeting Baltimore.
- Mr. Rajesh Pindoriya received Outstanding student volunteer award in 2019 from IEEE Delhi section.
- Mr. Daksh Thapar, Ph.D. student received second prize and a cash award of 50,000 INR at IDRBT Doctoral Colloquium in Hyderabad.
- Mr. Arshdeep Singh Selected for International Youth exchange programme by Ministry of Youth affairs.

- Ms. Yashika Arora: Attended IBRO APRC School 2019 with full fellowship support. International Brain Research Organization (IBRO) (Website: https://ibro.org/) is a global federation of neuroscience organizations that aims to promote and support neuroscience around the world through training, teaching, collaborative research, outreach and advocacy.
- Ms.Yashika Arora: Selected for the SERB Overseas Visiting Doctoral Fellowship for the year 2018-19 supported by the Science and Engineering Research Board (SERB). The fellowship has been approved for a duration of 6 months with Dr. Anirban Dutta at University at Buffalo, Buffalo, USA. (Award No. ODF/ 2018/ 000576).
- Ms. Yashika Arora: Submitted project proposal on: "Development of a near-infrared spectroscopy-electroencephalography (NIRS-EEG) system for diagnosis of ischemic and hemorrhagic stroke at the point of care" under BID (Biomedical Instruments and Devices Hub) call by Postgraduate Institute of Medical Education & Research, Chandigarh (February, 2020).
- Mr. Avinash Kumar: Won the best paper award for the paper "Sub-optimal Control Design for Second Order Non-linear Systems using Krotov Sufficient Conditions," in Advances in Control & Optimization of Dynamical Systems (ACODS), IIT Madras, India.
- Mr. Avinash Kumar: Won the best presentation award for the paper "Optimal Consensus Protocol Design for Scalar Single Integrators using Krotov Conditions," in Advances in Control & Optimization of Dynamical Systems (ACODS), IIT Madras, India.
- Mr. Gaurav Sharma and Ms. YashikaArora obtained the IBRO Fellowship for attending the International Summer School on Neurology held at Sri ChithraThirunal Institute of Medical Sciences, Thiruvananthapuram during April 23-May 09, 2019.
- Ms. Shruti Kaushik, PhD student, attended the prestigious Women in Machine Learning workshop held as a part of the 32nd Neural Information Processing Systems (NeurIPS) conference held at Vancouver Convention Center, Canada
- Mr. Sultan Alam, Dauood Saleem, and Ishtiyaq Qureshi also presented three posters at BITS 2020.

Media Coverage in Newspapers and TV with Photographs:

IIT Mandi collaborates with IIIT Una for academics, research activities

IIT Mandi and IIIT Una are continuously building links between the faculty members for potential research collaboration in the future

Speaking about the collaboration, Timothy A Gonsalves, Director, IIT Mandi, said, "IIT Mandi has always believed in influencing the world beyond its campus and its own students. One tangible way in which we are doing this is by exporting our unique project-based learning curriculum and pedagogical strategies to other institutes. Our collaboration with IIIT Una is an example of this. Our alumni and PhD degree holders are also helping disseminate our vision and innovative methods to their workplaces in India and around the world."

Update from Anirban Dutta's NIRlab: CGHE welcomes Visiting Research Assistant Yashika Arora!

By Lisa Yahapoglu

At his Neuroengineering and Informatics for Rehabilitation Laboratory (NIRlab) in the Department of Biomedical Engineering, CGHE faculty member Dr. Anirban Dutta works with near-infrared spectroscopy (NIRS)—a non-invasive imaging technique in which light of a particular wavelength is applied to chemicals or biological subjects.

Technology Innovation Hub at IIT Mandi will focus on Human Computer Interaction (HCI) research

DST To Set Up Technology Hub At IIT Mandi For Human-Computer Interaction Research

IIT Mandi all set for a new technology innovation hub | Pic: IIT Mandi

Under its National Mission on Interdisciplinary Cyber-Physical Systems (NM-ICPS), the Department of Science and Technology (DST) has sanctioned Rs 7.25 crore to IIT Mandi to establish a Technology Innovation Hub (TIH) at the Institute.

IIT Mandi to set up Technology Innovation Hub for entrepreneurship, skill development and more

The cheap sensor detecting landslides in India

https://www.bbc.com/news/world-asia-india-50313344

IIT Mandi researchers aid development of portable device to screen for cervical cancer

DST sanctions Rs 7.25 cr to IIT Mandi to establish tech hub with focus on human-computer interaction research

IIT Mandi designs algorithms for HVAC systems in buildings

Mandi, The Indian Institute of Technology Mandi (IIT Mandi) on Monday said its researchers have developed new algorithms for component failure detection and diagnosis that can enhance the energy efficient operation of Heating, Ventilation and Air Conditioning (HVAC) systems used in buildings.

In centralised HVAC systems in buildings, climate control and ventilation are performed at a centralised location outside the building by an Air Handling Unit (AHU) which results in better maintenance and no indoor noise.

The processed air is distributed to every room with the help of controlled ducts and excess air in the room is recirculated through the unit.

आई.आई.टी. में जलवायु नियंत्रण सिस्टम के लिए नया एल्गोरिद्म किया विकसित

Mr. Rajesh Pindoriya

Publications:There has been a celebration of the IEEE PES Day which was organized by the IEEE IAS SB Chapter and supported by IEEE PES-IAS Chapter of Delhi Section. This event was covered in the PES Newsletter (eNews Update). The same has been attached below:

eNewsUpdate

IEEE

IEEE PES Day Celebration: IIT Mandi, India

2nd IEEE PES Day Celebration IIT Mandi

Rajesh M. Pindoriya
Indian Institute of Technology Mandi
Mandi, Himachal Pradesh, India
IEEE SB Chapter IIT Mandi

eNewsUpdate

PES Energy Workshops for School Kids

IIT Mandi IEEE PES Student Branch Chapter organized two energy workshops on 9th October and 31st of October 2019. Two schools of remote Himalayan villages were chosen. The name of the schools are Government School, ... and Government School, ..., Himachal Pradesh, India respectively.

In the first workshop, two presentations about "Fundamental Physics of Solar Power Plant" and "The importance of Renewable Energy Sources" was given. In the second workshop there was a technical talk about "How to Harvest Sustainable Energy from Nature". In both the workshops the technical talks were followed by hands-on session named "Make a Solar Powered Lantern". The school students explored the different components of solar lamp and assembled them in the session.

IIT Mandi PES Student Chapter and the school students both were very much fortunate to have Professor MAHINDRA ARORA (Senior Member IEEE & Former Professor, IIT Kanpur) among them in the second workshop. Prof. Arora explained how the innovations in the field of renewable energy are shaping the future of the world. The students were very much inspired and motivated by his talk.

Fig 1. Hands-on Session on "Make Your own Solar Powered Lamp"

15 Students of 10th standard participated in the first workshop. 6 IEEE volunteers with the help of 4 School Teachers conducted the activity.

In the second workshop there were 17 students of 10th standard. 7 IEEE volunteers with the help of 3 teachers conducted the workshop.

Fig 2. Prof. Arora (Right Bottom) & IEEE PES Volunteers With the School Students

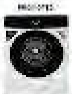
At the end of the program, the solar powered lanterns were given to the students to spread awareness about renewable energy.

Ritwik Ghosh
Chairperson, IIT Mandi IEEE PES Student Branch Chapter (SBC18191C)

NDTV

IIT Mandi Students Win IEEE Industry Application Society Awards

IIT Mandi students have won three awards of the Institute of Electrical and Electronics Engineering (IEEE) Industry Application Society, U.S.



Mandi, Himachal Pradesh: Indian Institute of Technology (IIT) Mandi students have won three awards under 'Outstanding Student Branch Chapter Chair', 'Continued Outstanding Performance Student Branch Chapter' and 'Web Content' categories in the Chapter and Membership Development (CMD) contest of the Institute of Electrical and Electronics Engineering (IEEE) Industry Application Society, U.S.

Adil Usman, PhD Scholar and Student Chapter Chair 2018; Rajesh Pindoriya, PhD Scholar and Student Chapter Chair 2019; and Jhalak Choudhary, 2nd Year B.Tech, Computer Science Engineering; and Utkarsh Jain, 2nd year B.Tech, Computer Science Engineering, IIT Mandi, will receive the awards during the IEEE IAS Annual Meet 2019, to be held in Baltimore, U.S., from 29th September 2019 to 3rd October 2019.

In June 2016, IEEE Industrial Application Society (IAS) Student Chapter IIT Mandi was formed with Dr. Bharat Singh Rajpurohit, Associate Professor, School of Computing and Electrical Engineering, IIT Mandi, as the Branch Counsellor and Dr. Ankush Bag, Assistant Professor, School of Computing and Electrical Engineering, IIT Mandi, and Dr. Hitesh Shrimali, Assistant Professor, School of Computing and Electrical Engineering, IIT Mandi, as Advisors. Through this more than 100 Workshops, Seminars, Technical Talks, IEEE Awareness and Outreach has been conducted till now.

Expressing his happiness towards the young achievers, Dr. Bharat Singh Rajpurohit, Branch Counsellor, IEEE-IAS Student Chapter, and Associate Professor, School of Computing and Electrical Engineering, IIT Mandi, said, "We are happy to see that students' ... efforts lead to an international recognition, especially at undergraduate level. Receiving an award at well-renowned conference with outstanding academicians and industry experts ... may open another avenue for ... career."

3.2 SCHOOL OF ENGINEERING (SE)

School of Engineering (SE), IIT Mandi is committed to serve society through innovation and excellence in engineering education and research focused on development of sustainable technologies. Our mission includes translation of research into the public benefit, integration of research with engineering education; diversify external research projects towards engineering solutions via cross-disciplinary research approach etc. School is committed for high standard of engineering education through outstanding teaching, innovative curricula, and excellent research environment. School of Engineering, IIT Mandi offers B.Tech in Mechanical Engineering and Civil Engineering, M.Tech. in Mechanical Engineering with specialization in Energy Systems (MES), M.Tech. in Energy Engineering with specialization in Materials (EEM) and M.Tech in Structural Engineering. In addition, we also offer M.S (by Research) and PhD in all areas of Mechanical & Civil Engineering.

School offers a number of common courses for B. Tech like Design practicum, Reverse engineering, Graphics for design, Materials science, Product realization technology, Mechanics of rigid bodies, Continuum mechanics and Engineering thermodynamics along with the core courses of Mechanical and Civil stream.

Presently, School of Engineering has 39 faculty members including 9 Associate Professors, 22 Assistant Professor, 2 Visiting Professor, 1 Emeritus Professor, 3 Distinguished Visiting Professor, 1 Adjunct Professor and 1 mentor professor. There are currently 90 PhD (including ERPD & Part time PhD scholars), 30 MS, 126 M.Tech and 219 (ME-121, CE-98) B.Tech students in the school.

The main areas of research are broadly classified as Materials and Design, Manufacturing, Thermo-fluids Engineering, Energy and sustainable Himalayan infrastructure. In Mechanical Design area, the focus is towards the development of materials for sensor, actuator & energy harvesting and energy storage applications and analysis of smart structures and systems. In thermo-fluids engineering, faculty members are investigating Radiative heat transfer, Nano-scale heat transfer and Flow analysis & Heat transfer analysis of IC engines. Energy efficient systems cover climate change studies, applications of phase change materials towards energy efficient buildings and the use of non-conventional energy sources at IIT Mandi to enhance energy efficiency. In addition, areas such as conventional and non-conventional Manufacturing, Materials for energy and device applications and Biomechanics etc. are actively investigated.

Sustainable Himalayan infrastructure encompasses the areas of slope stability, Geo hazard zonation, waste management, performance based design, construction materials, water resources, remote sensing and Environment engineering. To this end a good number of sponsored research projects have been granted by agencies such as SERB, DRDO, ISRO, NRDMS, MoES, DLR (German Aerospace Centre), BHEL, NMHS, Sparc and FIST etc. The school has several well equipped UG & PG labs (Design lab, Thermo-fluid lab, Mechanical workshop, Surveying lab, Geotechnical lab, Structure Analysis lab, Construction Materials lab, Environmental Engineering and Energy Engineering lab. In addition, we have several research labs IC Engine & renewable energy research lab, Nanoscale Materials & Device Research lab, Acoustic & Vibration lab, Composite design & Manufacturing research lab, Functional ceramics research lab, Smart Materials & Structure Research lab, Nanofabrication for energy materials, biomechanics, Thermoelectric materials, I4S & Biosensor & biomaterial Research labs etc.

Dr. Viswanath Balakrishnan

Chairperson & Associate Professor
Specialization: Growth of functional materials/thin films, Electron microscopy and in situ exploration of structure-property relationships PhD (Materials Science) from IISc, Bangalore (2008)
Home Town: Chidambaram, Tamil Nadu
Phone: 01905-267142
Email: chairse@iitmandi.ac.in,
viswa@iitmandi.ac.in

Prof. Ajit P. Annachhatre
Visiting Professor
Specialization:Environmental Engineering
PhD From: Indian Institute of Technology Mumbai (1987)
Home Town: Pune, Maharashtra
Phone: 01905-267905
Email: ajit@iitmandi.ac.in

Dr. Amit Shukla
Assistant Professor
Specialization:Control Systems, Robotics, Mechatronics, Machine Vision and Artificial Intelligence
PhD from Imperial College, London in 2012.
Home Town: Allahabad
Phone: 01905-267222
Email: amitshukla@iitmandi.ac.in

Dr. Arpan Gupta
Associate Professor
Specialization: Acoustics, Vibration, Bio-mechanics, Computational methods - FEM, CFD, Lattice Boltzmann Method
PhD from National University of Singapore (2012)
Home Town: Indore, MP
Phone: 01905-267922
Email: agupta@iitmandi.ac.in

Dr. Ashutosh Kumar
Assistant Professor
Specialization:Geotechnical Engineering
PhD from IIT Bombay (2018)
Home Town:
Phone: 01905-267825
Email: ashutosh@iitmandi.ac.in

Dr. Atul Dhar
Associate Professor
Specialization: IC Engines, Alternative Fuels, Emission Control
PhD from IIT Kanpur (2013)
Home Town: Sultanpur, Uttar Pradesh
Phone: 01905-267143
Email: add@iitmandi.ac.in

Dr. Deepak Swami
Assistant Professor
Specialization: Groundwater flow and transport modelling, Water resources development and management,Disaster mitigation specially related to floods and flash flood.
PhD from IITRoorkee (2014)
Home Town: Kota, Rajasthan
Phone: 01905-267912
Email- Deepak@iitmandi.ac.in

Dr. Dericks Praise Shukla
Associate Professor
Specialization: Remote Sensing & GIS, Hydro-geo-chemistry,
Water contamination mostly as and other Heavy metals,
Natural Hazards Assessment and Mapping
PhD from University of Delhi (2012)
Home Town: Allahabad, Uttar Pradesh
Phone: 01905-267147
Email- dericks@iitmandi.ac.in

Dr. Gaurav Bhutani
Assistant Professor
Specialization: Fluid and Thermal sciences
Ph.D from Imperial College London (2016)
Home Town: Delhi
Phone: 01905-267108
Email-gaurav@iitmandi.ac.in

Dr. Himanshu Pathak
Assistant Professor
Specialization: Computational Solid Mechanics, Fracture Mechanics,
Functionally Graded Materials
Ph.D from Indian Institute of Technology, Patna (2015)
Home Town: Muzaffarpur, Bihar
Phone: 01905-267908
Email- himanshu@iitmandi.ac.in

Dr. Jaspreet Kaur Randhawa
Assistant Professor
Specialization: Nanomaterials.
PhD from Gorakhpur University (2000)
Home Town: Mohali, Chandigarh
Phone: 01905-267056
Email- jaspreet@iitmandi.ac.in

Dr. Kaustav Sarkar
Assistant Professor
Specialization: Durability design of concrete, sustainable concrete production, finite element analysis, soft computing
PhD from Indian Institute of Technology, Delhi (2016)
Phone: 01905-267901
Hometown: Kolkata
Email-srkr@iitmandi.ac.in

Dr. Maheshreddy Gadde
Assistant Professor
Specialisation: Earthquake Engineering and Engineering Seismology
Ph.D from Indian Institute of Technology, Madras (2016)
Home Town: West Bengal
Phone: 01905-267223
Email-maheshreddy@iitmandi.ac.in

Dr. Mohammad Talha
Associate Professor
Specialization: Solid mechanics, Composite structures,
Functionally graded materials, Structural mechanics, Uncertainty quantification and Imperfection sensitivity in composites.
PhD from IIT Kharagpur (2012)
Home Town: Patna, Bihar
Phone: 01905-267152
Email- talha@iitmandi.ac.in

Dr. Mousumi Mukherjee
Assistant Professor
Specialization: Geotechnical Engineering
Ph.D from Indian Institute of Technology, Kanpur (2016)
Home Town: West Bengal
Phone: 01905-267119
Email-mousumi@iitmandi.ac.in

Dr. Parmod Kumar
Assistant Professor
Specialization: Thermal Engineering
PhD from IIT Roorkee (2018)
Home Town: Solan (Himachal Pradesh)
Phone: 01905-267264
Email: parmod@iitmandi.ac.in

Dr. Pradeep Kumar
Assistant Professor
Specialization: Fluid and Thermal Science
PhD from IIT Kanpur (2009)
Home Town: Jaunpur, Uttar Pradesh
Phone: 01905-267112
Email: pradeepkumar@iitmandi.ac.in

Dr. Pyudi Anil Kishan
Assistant Professor
Specialization: Computational Fluid Dynamics
PhD from IIT Kharagpur (2009)
Home Town: Tirupati, Andhra Pradesh
Phone: 01905-267141
Email: kishan@iitmandi.ac.in

Dr. Rahul Vaish
Associate Professor
Specialization: Glasses & Glass-ceramics
PhD (Engg.), Indian Institute of Science Bangalore (2010)
Home Town: Badaun, Uttar Pradesh
Phone: 01905-267139
Email-rahul@iitmandi.ac.in

Dr. Rajeev Kumar
Associate Professor
Specialization: Solid Mechanics, Vibration, FEM, Optimization
PhD from IIT Roorkee in (2008)
Home Town: Jaspur, Uttrakhand
Phone: 01905-267148
E-mail: rajeev@iitmandi.ac.in

Dr. Rajesh Ghosh
Assistant Professor
Specialization: Solid Mechanics, Biomechanics, Finite Element Analysis
PhD from Indian Institute of Technology Kharagpur (2013)
Home Town: West Bengal
Phone: 01905-267903
Email: rajesh@iitmandi.ac.in

Dr. Rik Rani Koner
Associate Professor
Specialization: Hybrid Materials
PhD from Indian Institute of Technology Guwahati (2009)
Home Town: Ballour, West Bengal
Phone: 01905-267220
Email: rik@iitmandi.ac.in

Dr. Sandip Kumar Saha
Assistant Professor
Specialization: Earthquake Engineering
Ph.D from Indian Institute of Technology, New Delhi (2014)
Home Town: Binodia, Mursidabad , West Bengal
Phone: 01905-267907
Email-sandip_saha@iitmandi.ac.in

Dr. Satvasheel Ramesh Powar
Assistant Professor
Specialization: Dye-sensitized solar cells, Perovskite solar cells
PhD from Monash University, Australia (2013)
Home Town: Kolhapur, Maharashtra
Phone: 01905-267136
Email- satvasheel@iitmandi.ac.in

Dr. Sayantan Sarkar
Assistant Professor
Specialization: Atmospheric Chemistry, Aerosols, Climate Change
PhD from Monash University, Australia (2013)
Home Town: Kolkatta, West Bengal
Phone: 01905-267829
Email- sayantan@iitmandi.ac.in

Dr. Subhamoy Sen
Assistant Professor
Specialisation: Structural Engineering
PhD from: IIT Kharagpur (2016).
Hometown: West Bengal
Phone: 01905-267261
Email-subhamoy@iitmandi.ac.in

Dr. Sudhir Kumar Pandey
Assistant Professor
Specialization: Condensed Matter Physics and Material Sciences.
Ph. D. from UGC-DAE Consortium for Scientific
Research, Indore (2007)
Home Town: Garhwa, Jharkhand
Phone: 01905-267852
Email: sudhir@iitmandi.ac.in

Dr. Sumit Sinha Ray
Assistant Professor
Specialisation: Mechanical Engineering
PhD University of Illinois, Chicago (2016)
Home town - Calcutta, West Bengal
Phone: 01905-267265
Email-sumitsinha@iitmandi.ac.in

Dr. Sunny Zafar
Assistant Professor
Specialisation: Manufacturing Engineering
Ph.D from Indian Institute of Technology, Roorkee (2016)
Home Town: Chandigarh
Phone: 01905-267268
Email- sunnyzafar@iitmandi.ac.in

Dr. Swati Sharma
Assistant Professor
Specialisation: Materials and Manufacturing
PhD from University of California, USA
Hometown: Bhopal
Phone: 01905-267113
Email-swati@iitmandi.ac.in

Dr. Venkata Uday Kala
Assistant Professor
Specialization: Geotechnical Engineering,
PhD from Indian Institute of Technology, Bombay (2013)
Home Town: Hyderabad
Phone: 01905-267149
Email: uday@iitmandi.ac.in

Dr. Vishal Singh Chauhan
Associate Professor
Specialization: Design Engg. Electromagnetic Radiation during Deformation of metals and alloys, Solid Mechanics, FEM
PhD from BIT Mesra, Ranchi (2009)
Home Town: Sanawad, MP
Phone: 01905-267044
E-mail: vsc@iitmandi.ac.in

Dr. Rajneesh Sharma
Visiting Assistant Professor
Specialization: Image based Finite element Methods, Cohesive zone modeling, In-situ Characterization of fracture process, Homogenization and multiscale modeling, Analysis and design of the composites under extreme loading environments
PhD from Indian Institute of Technology, Delhi
Home Town: Hamirpur, Himachal Pradesh
Phone: 01905-267144
Email-rajnishsharma@iitmandi.ac.in

Prof. Ing. Balthasar Novák
Adjunct Professor
Specialization: Civil Engineering
PhD From: Technical University Darmstadt (1995)
Email: balthasar.novak@iitmandi.ac.in

Prof. Tarun Kant
Visiting Distinguished Professor
Specialization: Specialization: Solid & Structural Mechanics - FEM, Composite Mechanics, Plates & Shells
PhD From: IIT Bombay
Phone: +91 22 2576 7310
Email: tkant@civil.iitb.ac.in

Prof. Sumant Nigam
Visiting Distinguished Professor
Specialization: climate dynamics
PhD From: Princeton University in 1984
Email: nigam@umd.edu, snigam@iitmandi.ac.in

Prof. Subrata Ray
Distinguished Visiting Professor
Specialisation: Physical metallurgy, Composites and Tribology
PhD from Indian Institute of Technology Kanpur (1976)
Home Town: West Bengal
Phone:
Email- sray@iitmandi.ac.in

Prof. Satish Chandra Jain
Emeritus Professor
Specialisation: Mechanical Engineering, Machine Design, Tribology, Vibration and Noise, Computer Aided Design
PhD from Indian Institute of Technology, Roorkee (Erstwhile University of Roorkee) (1983)
Home Town: Patparganj New Delhi
Phone: 01905-267278
Email-satish@iitmandi.ac.in

Mentor Professors

Dr. B. K. Mishra
Mentor Professor
Specialisation: Composite materials, Fracture mechanics, Wave propagation
PhD from IIT-BHU (1989)
Home Town:
Phone: +91-1332-285679
Email-bhanufme@iitr.ac.in

Dr. Sunil R. Kale
Mentor Professor
Specialisation: Heat Transfer, Fluid Mechanics, Particle-laden flows,
Combustion and Energy Conversion
Home Town: Pune, Maharashtra
Phone: +91-11-2659 1127
Email-S.R.Kale@mech.iitd.ac.in

Externally Sponsored Research Projects

Sr. No.	Project Title	Sponsoring Agency	Investigators	Project Cost (in Rs.)	Duration of Project
1.	Design analysis of adhesively bonded composite patch repair of cracked aluminum aircraft panels	ARDB Extramural Research Grant, DRDO Govt. of India	Dr. Himanshu Pathak (PI) Dr. Somnath Bhattacharya (Co-PI)	15,52,000	3 Years
2.	Development of carbon fiber reinforced polymer composites using microwave curing	ARDB Extramural Research Grant, DRDO Govt. of India	Dr. Sunny Zafar (PI) Dr. Himanshu Pathak (Co-PI)	15,52,800	3 Years
3.	Water and Energy Efficient Reliable Irrigation System (WatEr-ERIS): Solar energy and Cloud-based decision support systems for automated irrigation system	SERB	Dr. Kasi Viswanathan, Dr. Subhamoy Sen, Dr. Narsa Reddy, Dr. Soudarajan	95,00,000	3 years
4.	Development of damage detection technique for composite laminated structures under varying temperature	AERB -DRDO	Dr. Subhamoy Sen Dr. Rajnish Sharma	25,00,000	2 Years
5.	DST-ECR- Vibration based health monitoring of tensegrity structures incorporating the effects of ambient temperature	SERB	Dr. Subhamoy Sen	34,70,000	3 Years
6.	Engineering Novel Nanocomposites for Energy Storage and Conversion	DST-MES	Dr. Rik Rani Koner (PI) Dr. Sumit Sinha Ray (Co-PI)	51,68,422	3 years
7.	Engineering Nobel nanocomposite for energy storage and conversion	MHRD-SPARC	Dr. Rik Rani Koner (PI) Dr. Sumit Sinha Ray (Co-PI) Dr. David Eisenberg (PI) and Dr. Charles E. Diesendruck (Co-PI) from Technion Israel Institute of Technology	47,68,775	2 years

8.	New metal-organic networks as promising electro-active species for energy storage application: from materials developments to prototype fabrication	DST-SERB	Dr. Rik Rani Koner	30,51,000	3 Years
9.	Treatment of acid mine drainage for heavy metal removal	Ministry of Mines (GoI)	Dr. Sumit Sinha Ray (PI), Prof. Ajit Annachhatre (Co-PI)	19,83,970	3 years
10.	Computation modelling of polydisperse multiphase bioreactor system for wastewater treatment	MHRD-SPARC	Dr. Gaurav Bhutani (PI) , Prof. Ajit Annachhatre (Co-PI)	44,36,195	3 years
11.	Development of nanostructured wear resistant microwave clads to minimise slurry erosion in hydro turbines	SERB, DST Government of India	Dr. Sunny Zafar (PI)	53,30,750	3 years
12.	Development of carbon fibre reinforced polymer composites through microwave curing	AR&DB, DRDO,	Dr. Sunny Zafar (PI) and Dr. Himanshu Pathak (Co-PI)	15,25,800	2 years
13.	Efficient Removal of Most Penetrating Particles (diameter~ 300 nm) from Air/Water Using Supersonically-blown Ultrafine PVDF Nanofibers	DST-SERB	Dr.Sumit Sinha Ray	48,67,000	3 years
14.	Investigations of chugging phenomenon in direct contact condensation towards mitigation of the pressure amplitude and oscillations	SERB	Parmod Kumar	30,80,000	2 Years
15.	Rate-dependent Behavior of Sand and Its Implications on Strength Prediction from Field Penetration Tests	Early Career Research (ECR) Award, SERB	Dr. Mousumi Mukherjee	29,35,000	3 years
16.	Photocatalytic Active Transparent Glass Ceramics for Waste Water Treatment	CSIR	Dr. Vishal S Chauhan	21,16,000	3 years
17.	Engineering photoluminescence of tungsten sulfide through doping and electrical biasing	DST-JSPS	Dr. Viswanath B (PI) Dr. Yukio Sato, Kyushu University, Japan.	9,30,000	2 years

18.	Phase selective CVD growth with controllable 1T-to-1H phase transition in WS2 monolayer for optoelectronic device applications STARS/APR2019/654	MHRD - STARS	Dr. Viswanath B (PI)	49,95,000	3 years
19.	Scalable manufacturing of asymmetric micro supercapacitor for next generation energy storage devices	DST	Dr. Viswanath B (PI), Dr.Satvasheel Powar (Co-PI)	68,60,600	3 years
20.	Development of low cost accelerated water purification systems with added mineralisation for himalayan region	NMHS	Dr. Jaspreet Kaur Randhawa (PI) Dr. Bharat Singh Rajpurohit, Dr. Samar Agnihotri (Co-PI's)	40,66,000	3 years
21.	Spring Rejuvenation Programme for water security: "Jal Abhyaranya" IHR State: Himachal Pradesh Aspirational District: Chamba	NMHS	Dr. Jaspreet Kaur Randhawa (PI)	20,84,210	3 years
22.	Non-linear shape & vibration control of functional graded structure using functional graded piezo electric sensors and actuators	Aeronautical research board	Dr. Rajeev Kumar	18,03,000	3 years
23.	Design, Manufacturing and Testing of the Energy Systems	Department of Science & Technology, India	Dr. Rajeev Kumar	2,09,50,000	3 years
24.	Design and Analysis of manual operated Ropeway for river crossing	Society for Technology & Development, Mandi	Dr. Rajeev Kumar	1,75,000	3 years
25.	Solar Light driven waste water remediation using graphene ferroelectric composites	CSIR	Dr. Rahul Vaish	20,66,000	1 year
26.	Design and development of lightweight body armour	TBRL, DRDO	Dr. Himanshu Pathak (PI) and Dr. Sunny Zafar (Co-PI)	35,20,000	3 years

27.	Enhancement of Slurry Erosion, Wear, Corrosion Fatigue and Tribo-corrosion Performances of Metal Matrix Composite Microwave Clads through Ultrasonic Nanocrystal Surface Modification (UNSM) Technique for Hydro Turbine Applications	Indo-Korean Joint Call, DST	Dr. Sunny Zafar (PI) Dr. Auezhan Amanov (Korean PI)	79,14,665	3 years

Seed Grant Projects

Sr. No.	Project Title	Investigator	Amount Sanctioned (in Rs.)	Duration of Project
1.	Development and Implementation of extended finite element (XFEM) model for ductile crack growth in structural engineering applications	Dr. Himanshu Pathak	5,20,000	4.5 years
2.	Robust health monitoring of steel bridges under varying environmental and traffic conditions: an application to Victoria bridge	Dr. Subhamoy Sen	8,60,000	3 years
3.	Development, characterisations and mathematical modelling of microwave cured porous composites for biomedical applications	Dr. Sunny Zafar (PI) and Dr. Mohammad Talha (Co-PI)	14,50,000	3 years
4.	Intelligent design of intakes for hydraulic machines to retard the vortex induced entrainment	Dr. Parmod Kumar	8,00,000	3 years
5.	Determination of fracture properties of bone for diabetic and non-diabetic patients: experimental and numerical investigation	Dr. Rajesh Ghosh (PI) & Dr. Arpan Gupta (Co-PI)	12,00,000	3 years
6.	Development of Bio-degradable Polymer Based Ultrafine Nanofibrous Filter Membrane for Heavy Metal Removal	Dr.Sumit Sinha Ray	10,00,000	3 years
7.	Large-scale production of high-quality carbon from urban solid waste	Swati Sharma	10,00,000	3 years

PI-Dr. Himanshu Pathak

- **Project Title: Design analysis of adhesively bonded composite patch repair of cracked aluminum aircraft panels.**
  - The objective of present proposal is to develop an appropriate and efficient mesh independent computational model and code for patch repaired aircraft panel analysis. The work includes calculation of stress intensity factors, crack propagation and prediction of fatigue life of 2-D and 3-D repaired structure under cyclic loading environment.
- **Project Title: Development of carbon fiber reinforced polymer composites using microwave curing.**
  - The objective of this work is to develop low cost CNT-polymer nano-composite with enhanced mechanical properties for aero-space applications. From the studies, it has been found that microwave heating is efficient material curing techniques for plastics. Microwave heating technique results in economic and uniform cure irrespective of the geometry of the composite. Therefore, this work explores CNT-polymer fabrication process with microwave curing technique. The initial results show fast processing time and save much energy during composite fabrication, with enhanced mechanical properties of the composites.
- **Project Title: Development and Implementation of extended finite element (XFEM) model for ductile crack growth in structural engineering applications.**
  - The objective of proposed work is to develop extended finite element method (XFEM) codeforductile structural member under thermo-mechanical loading. This includes the evaluation of J–integral and J-R curve-based fracture criterion for commonly used ductile material componentssuch as aerospace structure, automobile body and nuclear reactors. However, before attemptingthe 3-D elasto-plastic problem, a code will be built up for 2-D plate with crack under mechanicaland thermal loading environment. Standard plane 2-D crack problems would be analyzed forcrack growth, crack closure and crack interaction phenomenon using XFEM. Further, thedeveloped code will be extended for 3-D cracked domain. The developed code will be validatedwith analytical, numerical and experimental results available in the literature. In the next phase,different design issues such as crack interaction, crack closure and crack blunting effect undercombine thermo-mechanical loading will be analyzed.

PI-Dr. Sumit Sinha Ray and Prof. Ajit Annachhatre (Co-PI)

- **Project Title: Treatment of acid mine drainage for heavy metal removal.**
  - A sulfidogenic reactor was established employing biological sulfate reduction process for treating copper containing industrial wastewater such as Acid Mine Drainage (AMD). Heavy metal sulfide precipitation was carried out by using sulfide rich effluent from sulfidogenic reactor as well as through chemical precipitation using Na2S. Copper removal efficiency upto 60% was achieved by biogenic sulfide precipitation as compared to 90% by chemical precipitation.In parallel, investigations were conducted to evaluate the adsorption of copper ions from aqueous solution onto Egg Shells (ES), Spent Tea Leaves (STL) and their biochars. Batch adsorption studies indicated that copper removal by ES was 84.5% obtained with copper adsorption capacity of 422.5 mg/g. On the other hand, STL yielded 91% copper removal with copper adsorption capacity of 447.5 mg/g. Adsorption kinetics studies revealed that ES followed pseudo-first-order kinetics while as STL followed pseudo-second-order kinetics.

PI-Dr. Subhamoy Sen

- **Project Title: Robust health monitoring of steel bridges under varying environmental and traffic conditions: an application to Victoria bridge.**
  - The primary experimentation with the Victoria Bridge has started. The SHM methodology has been developed. Once the data is ready, the method can be employed on the data. We got one conference and one journal publication from this project.
- **Project Title: Water and Energy Efficient Reliable Irrigation System (WatEr-ERIS): Solar energy and Cloud-based decision support systems for automated irrigation system.**
  - The filtering algorithm for hydrologic parameter estimation has been developed and got published in a high ranking journal. The works on battery management is going on.
- **Project Title: DST-ECR- Vibration based health monitoring of tensegrity structures incorporating the effects of ambient temperature.**
  - Form finding algorithm has been developed. Static and dynamic instability is also investigated. The SHM methodology is under investigation. We got one book chapter out of this work and one conference publication.

PI-Dr. Atul Dhar

- The project titled **"Sustainable waste water treatment for biofuel production"** has successfully demonstrated proof of concept at 20 liter scale. The 250 liter prototype of WWT plant tested for 1 day retention time is successful in reducing the COD of WW to 30 mg/L.

PI-Dr. Arpan Gupta

- DST YSS project entitled **'Design of Quieter Hard disk using Sonic Crystal'** has been successfully completed and closed. The project led to graduation of one PhD, one patent and five international journal papers.

PI-Dr. Gaurav Bhutani

- **Project Title: Computational modelling of polydisperse multiphase bioreactor systems for wastewater treatment.**
  - Computational modelling of polydisperse multiphase bioreactor systems for wastewater treatment – Bivariate model implementation completed in the open-source Fluidity software. A paper was presented at the ICCMS 2019 conference on this progress. Deepak Singh (MS student) visited Imperial College London to work on the model validation and implementation. Gaurav Bhutani and Ajit Annachhatre visited Imperial College London to discuss implementation details. Pablo Brito-Parada and Stephen Neethling will be visiting IIT Mandi in September 2020 to deliver a course and workshop.

PI-Dr. Sunny Zafar

- **Project Title: Development of carbon fibre reinforced polymer composites through microwave curing.**
  - Set up to cure thermoset composites using vacuum assisted microwave curing developed.
  - Pilot experiments completed.
  - Paper under review

PI-Dr. Mousumi Mukherjee

- **Project Title: Rate-dependent Behavior of Sand and Its Implications on Strength Prediction from Field Penetration Tests.**
  - The conceptual visco-plastic material model proposed by Mukherjee (2016) has been generalized and verified for its applicability under triaxial test condition. Presently work is

going on to embed the visco-plastic material model within a commercially available FEA analysis software ABAQUS by writing UMAT subroutine. The project work also involves simulation of pile penetration test under large deformation framework. In this regard, two different formulations, i.e. updated Lagrangian and coupled Lagrangian Eulerian, have been explored to identify their effectiveness in simulating pile penetration problem. Two manuscripts, one international journal and one international conference, are presently under preparation which will be addressing these research outcomes.

PI-Dr. Parmod Kumar

- **Project Title: Intelligent design of intakes for hydraulic machines to retard the vortex induced entrainment.**
  - An experimental facility has been developed to perform the pump intake vortex induced air entrainment experiments. The calibration of the measuring instruments has been completed and exhaustive experimentation has started using a single cylindrical discharge tube of 25 mm internal diameter. The initial experiments have reported the six different characteristic features of the associated vortex structures. The further work includes the development of a regime map considering wide range of parametric variation for vortex categorization. Moreover, the computational simulations of the phenomenon are also being carried out using Eulerian approach based volume of fluid framework. The simulations will assist in understanding the detailed hydrodynamics of the interface evolution.
- **Project Title: Investigations of chugging phenomenon in direct contact condensation towards mitigation of the pressure amplitude and oscillations.**
  - All the equipments have been ordered for the development of experimental setup and in the meantime the computational work has been started. In specific, the development of user defined function (UDF) for introducing interfacial mass transfer in volume of fluids method using software package ANSYS FLUENT is being carried. In modeling the emphasis is given on the interphase heat transfer using interfacial jump approach.

PI-Dr. Rajesh Ghosh

- **Project Title: Determination of fracture properties of bone for diabetic and non-diabetic patients: experimental and numerical investigation.**
  - Type 2 diabetes mellitus (T2DM) commonly affect the bone quality and leading to increase the risk of bone fracture. Our recent results indicate that low dose naltrexone (LDN), a TLR4 antagonist treatment, improves glucose tolerance in high-fat diet (HFD) mice and also gave protection against HFD-induced weight gain. However, effect on bone is still unknown. This study provides how LDN improves bone quality (nano to macro) in HFD induced T2DM mice bone. Bone quality was measured in terms of fracture toughness, nano-Young's modulus and hardness, mineral crystal size, bone composition, and bulk mineral to matrix ratio. Results indicated that fracture toughness, nano-Young's modulus, and hardness were significantly decreased in T2DM bone, and interestingly, treatment with the LDN increases these parameters in T2DM bone. T2DM bone has smaller apatite mineral crystal size, reduced bulk mineral to matrix ratio as compared to healthy bone. LDN treatment protects these alterations in the T2DM mice bone. The geometric parameters of bone were increases in the case of HFD bone; however, LDN cannot protect to increase the bone geometric parameters in the T2DM mice bone. In conclusion, LDN can be used to control the T2DM affected bone properties and attenuates the risk of bone fracture.

PI-Dr. Sumit Sinha Ray

- **Project Title: Efficient Removal of Most Penetrating Particles (diameter~ 300nm) from Air/Water Using Supersonically-blown Ultrafine PVDF Nanofibers.**
  - Here in this work a new kind of ultrafiltration membrane will be developed which will be value added and relatively inexpensive in terms of manufacturing, yet will be effective in entrapment of 300-500 nm particles, both air and water borne. In the present work, supersonic solution blowing, a novel method of technical textile fabrication will be introduced to produce ultrafine PVDF nanofibers for filtration application and this method will be introduced to India for the first time. The objectives of the work are following:
  - To develop supersonic solution blowing to produce 20-50nm nanofibers from PVDF in mass scale and on demand.
  - Development of efficient filter membrane with ultrafine nanofibers as surface filters for both air and water and thereby rendering the commercially available moderate efficient filters more capable towards capturing 300-500nm air and water-borne nanoparticles, which also mimic the standard water borne viruses like Reoviridae family or Caliciviridae family.As an objective of this work, the net fabrication facility and air/water purification set up has been developed.

PI-Dr. Rajeev Kumar

- **Project Title: Non-linear shape & vibration control of functional graded structure using functional graded piezo electric sensors and actuators.**
  - Non-linear shape & vibration control of functional graded structure using functional graded piezo electric sensors and actuators: In this project, a finite element based model has been developed to perform static and dynamic analysis of functional graded piezolimated structure. A fuzzy logic controller also has been developed to control the vibration of antenna reflector. At present, numerical studies are being carried out.
- **Project Title: Design and Analysis of manual operated Ropeway for river crossing.**
  - In this project, a manual operated ropeway system has been designed and based on the design, a proptype is being developed.

PI-Dr. Kaustav Sarkar

- The SERB-ECR project titled **"Modelling of hydraulic diffusivity and its application in the FE simulation of moisture transport in concrete for assessing corrosion risk"** has been granted a 9 months extension until December 2020. Presently, experimental work is underway. The work envisages to contribute to the domain of durability-design of reinforced concrete. The present practice to provide for durability is largely based on prescriptive measures and this often results in premature deterioration of structural elements. Its most widespread manifestation occurs in the form of reinforcement corrosion.

PI-Dr. Viswanath Balakrishnan

- **Project Title: Scalable manufacturing of asymmetric micro supercapacitor for next generation energy storage devices.**
  - We achieved good progress in the area of supercapacitor which is related to DST-MES project. Integration of high surface area nanostructures with conducting and deformable electrodes at large scale are of significant importance for flexible supercapacitors with high cyclic stability and low cost. We investigated water assisted meter scale growth of aligned iron oxide and CNT 1D nanostructures on flexible stainless steel mesh for asymmetric supercapacitor device applications. Both iron oxide and CNT nanostructures were tested for supercapacitor electrode material in neutral electrolytes. Further, asymmetric solid state devices were fabricated and connected in serial fashion to demonstrate glowing of LEDs as well as rotation of 5V micro fan. In addition, at bending angle of 900, device showed 68% increase whereas, at 180o it showed 13% decrease in capacitance. The calculated specific capacitance for single device is found to be 14.4 mF/cm2. Corresponding energy

density and power density are found to be 3 □W-hr/cm2 and 0.74 mW/cm2 respectively. The device showed remarkable capacitance retention of 87% over 25,000 charge discharge cycles. The flexible nature with remarkable cyclic stability of solid state iron oxide/CNT device is suitable for low cost flexible and wearable supercapacitor applications

PI-Dr. Swati Sharma

- **Project Title: Large-scale production of high-quality carbon from urban solid waste.**
  - Multiple necessary equipment have been ordered from the seed grant project. While some basic consumables and furniture has arrived, the primary research equipment are yet to be installed. One PhD student joined the group who is currently undergoing various trainings including microfabrication, electrochemical testing and writing tools such as LaTeX. Two M.Tech. students are working on designing the pyrolysis reactors for waste treatment. Two M.Sc. Chemistry students have started working on synthesis of useful chemicals such as resins from waste orange peel. Detailed experimental research will start as soon as the necessary equipment are installed and a furnace can be purchased.

PI-Dr. P. Anil Kishan

- **Project Title: Solar Energy Storage using Phase Change Materials for Space Heating Applications.**
  - Numerical simulations were carried out to find the impact of the Reynolds number on the on melting and solidification characteristics of the phase change material (PCM). It is found that the turbulent flow melts and solidifies the PCM at a faster rate than the laminar flow. With 80% partial charging and discharging, one can reduce the melting and solidification time. We can keep the PCM temperature close to the melting/solidification temperature. The stratification is reduced using the multiple partial charging/discharging of PCM. Fig. 1 shows the impact of Reynolds number on charging and discharging times while Fig. 2 shows the impact of Reynolds Number on temperature of PCM.

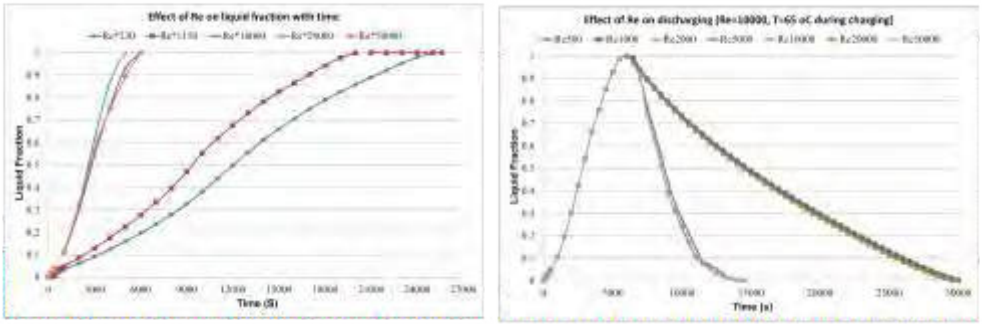


Fig. 1 Impact of Reynolds number on melting and solidification of PCM

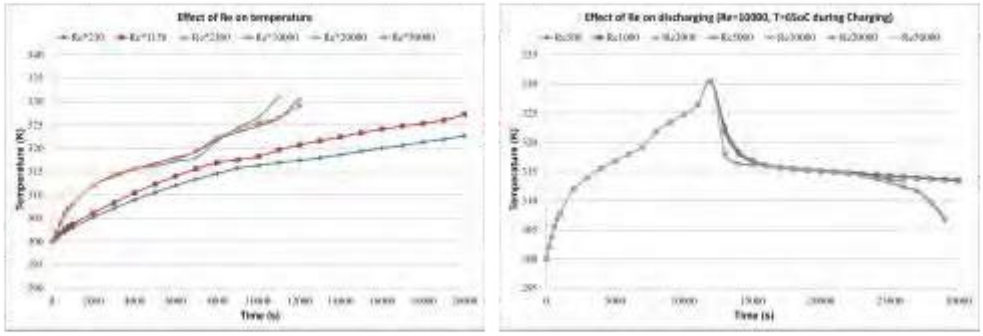


Fig. 2 Impact of Reynolds number on melting and solidification of temperatures of PCM

By using the multiple water streams, one can reduce the average melting and solidification times and reduces the stratification of the PCM. Fig. 3 shows the contours of the molten fraction and temperature of PCM with multiple heat transfer fluid streams.

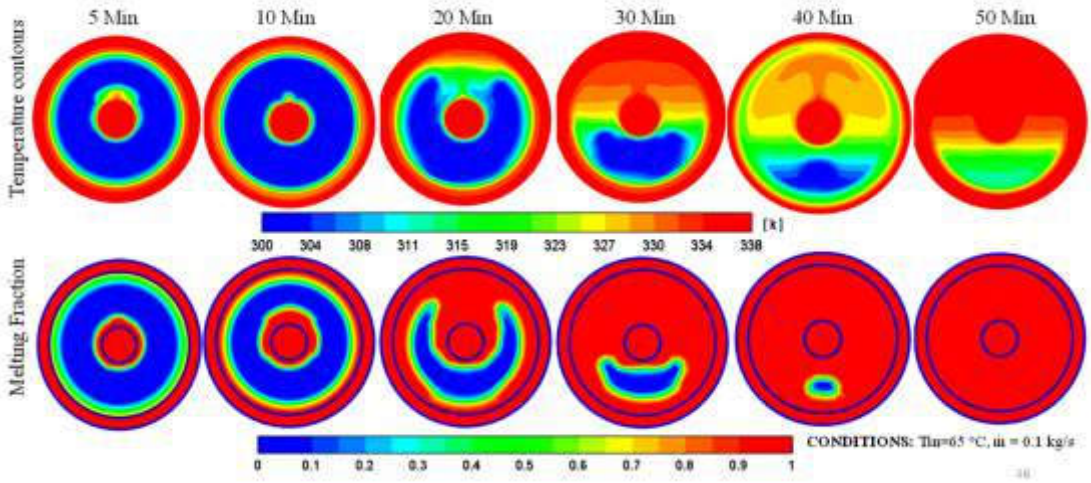


Fig. 3 Comparison Temperature contours and melting fraction with Time for multiple heat transfer streams.

An experimental setup was built to study the solar energy storage using PCM. The experimental setup along with schematic arrangements is shown in Fig. 4.

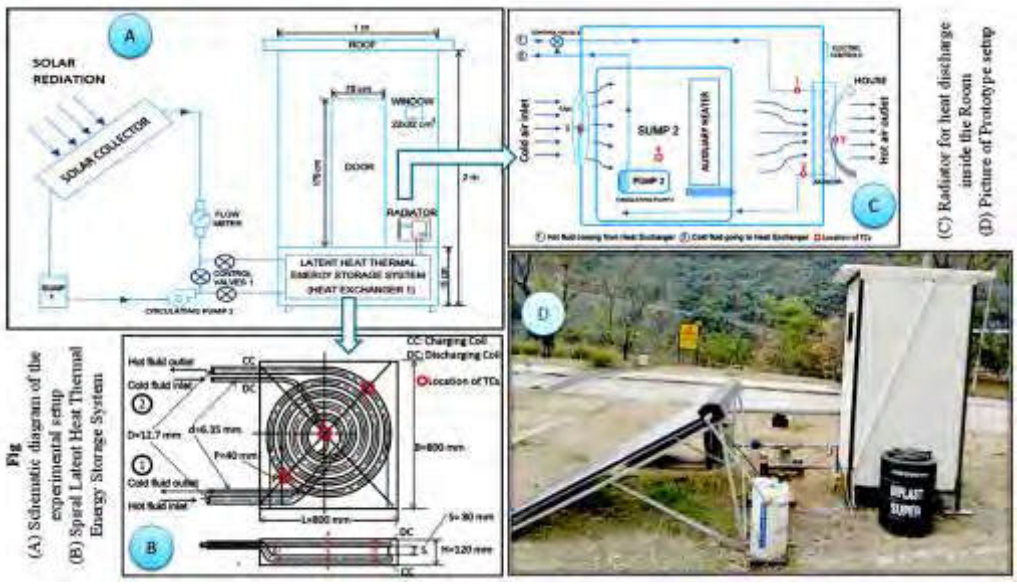


Fig. 4 Schematic diagram and photo of experimental setup

Published Book chapters:

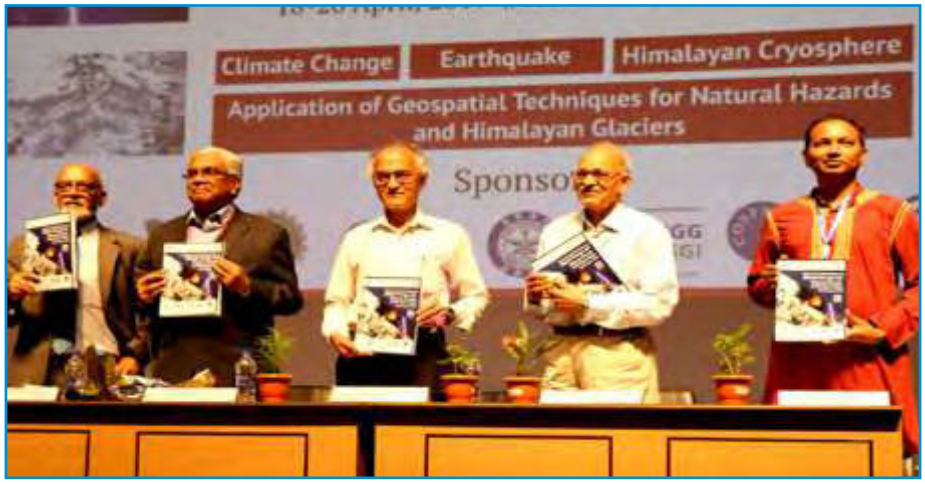
- Mousumi Mukherjee and Arindam Dey (2020), Bearing Capacity of Square Footing: A Comparative Study Employing Non-associative MC and MCC Model, in Advanced Numerical Methods in Foundation Engineering, GeoMEast 2019, Ed. H. F.Shehata, B. M. Das, A. P. S. Selvadurai and A. Fayed, Springer, Cham, pp. 34-47,ISBN No. 978-3-030-34192-3.
- Gaurav Bhutani, Mousumi Mukherjee and Dikshita Nath (2020) Influence of non homogeneous viscosity on the dynamics of debris flow: a numerical study, in Advances in Computer Methods and Geomechanics, Selected papers from the Symposium of the International Association for Computer Methods and Advances in Geomechanics (IACMAG) 2019, Ed. Prashant et al., Springer. DOI: 10.1007/978-981-15-0886-8-26.

Sl. No	Patent detail/Title	Patent apply detail	Inventor detail	Year of filing	File no./ Application number	Current status
1.	Method for manufacturing thermoplastic composite from microwave-assisted compression moulding	Patent office, New Delhi.	Dr. Sunny Zafar, Dr. Manoj Kumar Singh, and Dr. Nishant Verma	2020	202011008147	Filed
2.	An Ankle Prosthesis	Patent office, New Delhi.	Dr. Subrata Mondal; Dr. Rajesh Ghosh	2019	201911040321	Filed
3.	Single step synthesis of multimodal magneto - fluorescent core -shell superparamagnetic	Patent office, New Delhi.	Dr. Jaspreet Kaur randhawa	2020	202011021910	Filed

Short Term Course/Workshop organized

Group photograph with Participants & organizers (FEMER2019)

- A short-term course on Finite Element Method for Engineers and Researchers (FEMER2019) was successfully organized by School of Engineering, IIT Mandi during 24th to 28th June 2019 at Kamand Campus. This course was partially funded by CSIR and SERB (Govt. of India).Over 55 participants attended the course; the participants were from research labs, government agencies, industries, engineering colleges and technical institutes. Dr. Himanshu Pathak and Dr. Rajeev Kumar from School of Engineering, IIT Mandi were the coordinators of this short-term course (FEMER-2019).
- Advance Composites for Aerospace: Design, Manufacturing and Condition Monitoring Perspective- DMCMP2020 In collaboration with AR&DB, Structure Panel, 11th – 15th February 2020. (Coordinators - Dr. Subhamoy Sen).
- Organized a 7 day AICTE sponsored Faculty Developed Programme on “Universal Human Values for Student Induction" during December 25 - 31, 2019. More than 30 teachers from various professional colleges of HP participated in the course. (Coordinators - Dr. Atul Dhar, Dr. Sudhir Pandey).
- Organized a 7 day AICTE sponsored Faculty Developed Programme on “Universal Human Values for Student Induction" during June 2019. More than 65 teachers from various professional colleges of India participated in the course. (Coordinators - Dr. Atul Dhar, Dr. Sudhir Pandey).
- A National Workshop on Advanced Composites for Aerospace: Design, Manufacturing and Condition Monitoring Perspective during 11-15 February 2020 at IIT Mandi. (Coordinators - Dr. Sunny Zafar & Dr. Himanshu Pathak.
- Organized International Workshop on Climate Change and Extreme Events (C2E2) in the Himalayan Region at IIT Mandi from 18th to 20th April,2019 The workshop was aimed at understanding the effects of climate change, melting of glaciers, increased frequency of extreme events, atmospheric pollution, pollution due to crop residue burning in Himalayan region and applications of remote sensing. (Prof. Ramesh P. Singh, Dr. Kaustav Sarkar, Dr. Dericks P. Shukla, and Dr. Kala Venkata Uday, School of Engineering, IIT Mandi, were the Workshop Co-Coordinators).



Climate Change and Extreme Events C2E2 workshop

- Organized the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE) TC-105 mini-symposium on "Geomechanics from Microto Macro" on December 12, 2019 at IIT Mandi. (Co-coordinators - Dr. Mousumi Mukherjee).
- Co-coordinated the international conference, "7th International Congress on Computational Mechanics and Simulation (ICCMS2019)" during December 11-13, 2019 at IIT Mandi. (Coordinators - Dr. Sandip Saha & Dr. Mousumi Mukherjee, Co-Coordinator- Dr. Kaustav Sarkar).
- Dr. Mousumi Mukherjee, Organized a 3-day hands-on training session on ABAQUS software conducted by EDS Technologies at IIT Mandi, October 23-25, 2019.
- Organized a 4th International and 19th National conference on Machines and Mechanism (iNaCoMM2019) during December 5-7, 2019 at IIT Mandi. Organizing committee members are:
  - **Patron:** Prof. Timothy A. Gonsalves, Director, IIT Mandi
  - **Chairman Organizing Committee:** Prof. S.C. Jain
  - **Convener:** Dr. Rahul Vaish
  - **Co-Convener:** Dr. Viswanath Balakrishnan
  - **Organizing Secretary:** Dr. Rajeev Kumar
  - **Joint Organizing Secretary:** Dr. Mohd. Talha
  - **Joint Organizing Secretary:** Dr. Himanshu Pathak
  - **Treasurer:** Dr. Vishal S. Chauhan

Visits and Talks in the Different Conferences/Workshop

- Dr. Atul Dhar, attend the Exhaust Heat Recovery options for Diesel Engines" in IV ISEES International Conference on Sustainable Energy and Environmental Challenges at CSIR-NEERI, 26-27 November 2019.
- Dr. Arpan Gupta, iNaCoMM 5- 7 Dec, 2019 - 4th International and 19th National Conference on Machines and Mechanisms at IIT Mandi.
- Dr. Arpan Gupta, attended the ICCMS 2019 – 11 – 13 Dec - 7th International Congress on Computational Mechanics and Simulation at IIT Mandi.
- Prof. Ajit Annachhatre, 3rd International Conference on Innovative Technologies for Clean and Sustainable Development Chandigarh, India, 19–21 February 2020.
- Dr. Gaurav Bhutani, attended the 7th International Congress on Compu-tational Mechanics and Simulation (ICCMS 2019) during 11-13 December at IIT Mandi.
- Dr. Himanshu Pathak, Expert talks at the lecture series on Composite Materials and Computational Mechanics at NIT Jaipur during 16-18 December 2019.
- Dr. Himanshu Pathak, Invited lectures in Workshop on Computational Methods in Mech. Engg. At NIT Hamirpur during 3-5 March 2020.

- Dr. Parmod Kumar, attended and presented the paper titled "Kerosene Drop Impact onto a Deep Water Pool" in 14th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics (HEFAT 2019) July 22-24, 2019, Wicklow, Ireland.
- Dr. Parmod Kumar, Presented a paper titled "Effect of the Moving Free Surface on the Dynamics of the Central Jet during Drop Impact onto a Deep Liquid Pool" in Multiphase Flow session of IHMTC-2019.
- Dr. Parmod Kumar, Delivered lectures in short term course on "Advances in Sustainable Thermal Energy Systems: Theory and Computation" at NIT Hamirpur.
- Dr. Parmod Kumar, Delivered lectures in short term course on "Applications of Computational Methods in Mechanical Engineering" at NIT Hamirpur.
- Dr. Parmod Kumar, attended the 25th National and 3rd International ISHMT-ASTFE Heat and Mass Transfer Conference (IHMTC-2019) December 28-31, 2019, IIT Roorkee, India.
- Dr. Pradeep Kumar, 9th International Symposium on Radiative Transfer 3-7 June 2019, Athens, Greece.
- Dr. Pradeep Kumar, 3rd International and 25th National ISHMT-ASTFE Heat and Mass Transfer Conference, 28-31 December 2019, IIT Roorkee, India
- Dr. Rik Rani Koner, attended the International Conference on Functional Materials-2020" (ICFM-2020)"IIT Kharagpur, 6-8 Jan, 2020. Invited Speaker : Title - "Functional Soft Materials: From Molecular Recognition to Catalysis".
- Dr. Rajeev Kumar, Delivered a talk on "Smart Laminated Composite Structure: Mechanics and Simulation" at National Workshop on Advanced Composites for Aerospace: Design, Manufacturing and Condition Monitoring Perspective. During Feb 11-15, 2020, at IIT Mandi.
- Dr. Mohd. Talha, attended and delivered a talk on "Nonlinear Finite Element Flexural Analysis of Gradient Plates with Initial Geometric Imperfections" at the 27th Annual International Conference on Composites/ Nano Engineering (ICCE-27) in Granada, Spain; Dated: July 14 - 20, 2019.
- Dr. P. Anil Kishan and his PhD scholar Mr. Pushpendra Kumar Shukla, CFD Analysis of Latent Heat Energy Storage System with Different Geometric Configurations and Flow Conditions, 25th National and 3rd International ISHMT-ASTFE "Heat and Mass Transfer Conference" (IHMTC-2019), December 28-31, 2019, IIT Roorkee, Uttarakhand, India.
- Dr. P. Anil Kishan and his PhD scholar Mr. Pushpendra Kumar Shukla, Experimental and Numerical Analysis of Double Pass Solar Air Heater with PCM Energy Storage for Space Heating, Fourth International Conference on Sustainable Energy and Environmental Challenges (IV SEEC), November 27-29, 2019, CSIR – NEERI, Nagpur, India.
- Dr. Sunny Zafar, Delivered a talk on "Microwave Processing of Green Composites" at JIET, Jodhpur on 7th January 2020.
- Dr. Sunny Zafar, given expert lecture under TEQIP-III on "Additive Manufacturing and Robotics" at SIRDA Institute of Engineering, Sunder Nagar on 19th November 2019.
- Dr. Sumit Sinha Ray, attended the 2nd International Conference on Functional Textiles & Clothing 7th - 9th Feb, 2020, IIT Delhi, New Delhi, India
- Dr. Sumit Sinha Ray, attended the 3rd Young Researchers Symposium, IIT Delhi, May 2019.
- Dr. Sumit Sinha Ray, Delivered invited lecture on Solution Blowing: a Novel method for textile manufacturing at IIT Delhi Textile Department, 5th Feb 2020.
- Dr. Sumit Sinha Ray, Delivered invited lecture on Nonwoven methodology and rheology at Jawaharlal Nehru Government Engineering College, Sunder Nagar on 9th Nov 2019.

- Dr. Swati Sharma, Delivered a talk on "Manufacture and applications of waste-derived carbon" at the Conference on Carbon Materials organized by the Indian Carbon Society, Delhi, India, September 2019.
- Dr. Pradeep Kumar, An invited talk on Computation of Non-Gray Radiation Heat transfer and its Interaction with Fluid Flow at LPSC and VSSC centers of ISRO at Kerala during 10th February 2020.
- Dr. Pradeep Kumar, Similar Talk during 13th March 2020 at Institute for Plasma Research Ahmedabad.
- Dr. Pradeep Kumar, Two talks on Computational approach in Laser cutting and melting and Computation of solar assisted devices in Short term course on RAMM-19 organised by BIET, Jhansi during 23-27 July 2019.
- Dr. Pradeep Kumar, An invited talk on Effect of Non-Gray Radiation on Fluid Flow at PDPU, Gandhinagar during 27th January 2020.
- Dr. Sandip Kumar Saha, Attended and presented a technical paper in the "16th World Conference on Seismic Isolation, Energy Dissipation and Active Vibration Control of Structures", held in St. Petersburg, Russia, 1- 6 July, 2019.
- Dr. Viswanath Balakrishnan, attended & Delivered invited talk in 12th Asia-Pacific Microscopy Conference (APMC) organized by Electron Microscopy Society of India (EMSI) held at HICC, Hyderabad, India during 3rd -7th February, 2020.
- Dr. Mousumi Mukherjee, Delivered a talk on Stability Analysis of Rock Slopesduring the 5-day workshop on "Training Program on Landslide Mitigation and DPR Preparation for Practicing Engineers", organized by IIT Mandi and NDMA during September 23-27, 2019.
- Dr. Subhamoy Sen, attended the Non-destructive evaluation conference at Bangalore, December, 2019.

Achievements/Awards

- Dr. Arpan Gupta, Teaching Honour Roll Award given on the occasion of Teacher's Day 2019 for significant contribution to student learning through excellence in teaching during the academic year 2018 – 2019.
- Dr. Gaurav Bhutani, presented at University of Queensland (Jul 2019), continuum modelling of snow avalanches.
- Dr. Parmod Kumar, awarded with the Best paper award in Multiphase Flow session of HEFAT-2019 for "Kerosene Drop Impact onto a Deep Water Pool".
- Dr. Sumit Sinha Ray, Received best presentation award at 3rd Young Researcher's Symposium, IIT Delhi , May 2019.
- Piyush Avasthi PhD scholar of Dr. Viswanath Balakrishnan, won Best poster in International Conference on Electron Microscopy and Allied Analytical Techniques (EMAAT) organized by Electron Microscopy Society of India (EMSI) held at Shimla, Himachal Pradesh during 7th-10th June, 2019.
- Nitika Arya PhD scholar of Dr. Viswanath Balakrishnan, won the Materials Chemistry Frontiers Poster Prize (Best Poster) at the International Workshop on Advances in 2D Materials (IW2DM) held at Indian Institute of Science Education and Research (IISER), Thiruvanan-thapuram, India on 22-23 July, 2019.
- Nitika Arya PhD scholar of Dr. Viswanath Balakrishnan, won Best Poster prize in 12th Asia-Pacific Microscopy Conference (APMC) organized by Electron Microscopy Society of India (EMSI) held at HICC, Hyderabad, India during 3rd-7th February, 2020.
- Mr Sharad Kr Gupta (PhD student) and Ms Vanshika Gupta (Intern) got first and third prize by Zeiss group. Students of Dr. Dericks P. Shukla.
- Mr Sharad Kr Gupta (PhD student) of Dr. Dericks P. Shukla also received Austin grant for attending AGU conference in San Francisco, US.

- Dr. Sandip K. Saha's Ph.D. Scholar Ms Yati Aggarwal (D17050) received GRANT-IN-AID (JPY 100,000) to attend the "17th World Conference on Earthquake Engineering (17WCEE)" in Japan.
- Neeraj Singh, Naman Agarwal, Mr. Deepak Singh & Hrishikesh and Abhinav (B.tech, 4th year) Scholars of Dr. Gaurav Bhutani presented the paper in ICCMS 2019, at IIT Mandi.
- Conference paper titled "Sequence of Hydrodynamic Phenomena during the Interactions of Drop and Bubble in Vertical Conduit" presented by M.Tech student Subhav Chauhan (Course: MES) in ICCMS-2019 at IIT Mandi has been accepted for publication as book chapter in special issue of Springer. Mr. Subhav doing research under Dr. Parmod Kumar.
- Mr. Ashish Kakoria received travel grant to present his research on solution blown nanofibers for heavy metal removal at International Workshop on Advanced Materials (IWAM) 2020, Dubai, Feb 2020. He doing his research under Dr. Sumit Sinha Ray.

Salient Research Achievements of Dr. Rik Rani Koner

- Development of iron xerogel derived nanocomposite (Fe3O4/Fe/C) for oxygen reduction reaction and supercapacitor. The nanocomposite displayed excellent ORR activity with onset potential of 0.86 V vs. RHE. The same nanocomposite was found to have charge storage property for supercapacitor with highest specific capacitance value of 245 F/g at 1 A/g current density. (Chem. Eur.J. 2018, 24, 6586 –6594).
- Development of trifunctional catalyst towards oxygen reduction, hydrogen evolution and oxygen evolution reaction using nickel nanoparticles encapsulated heteroatom doped graphitized carbonaceous matrix from newly synthesized Ni based dimeric complex. This catalyst exhibits an outstanding trifunctional catalytic performance with onset potential of 0.86 V, 1.52 V and -0.02 V (vs. RHE) for oxygen reduction reaction (ORR), oxygen evolution reaction (OER) and hydrogen evolution reaction (HER) respectively. (ACS Sustainable Chem. Eng.2019, 7, 2187-2199).
- Fabrication of supercapacitor device using Co-MOF derived cobalt nanoparticles embedded graphitized carbon nanostructure as electrode material. This material demonstrates the bifunctional application for ORR and charge storage in super-capacitors which has scope for practical application in energy conversion and storage devices. The Co-NC3 nanostructure derived from Co-MOF bestowed with onset potential (0.90 V vs. RHE) and half-wave potential (0.81 V vs. RHE) for oxygen reduction reaction which is comparable to commercial 20 wt.% Pt/C catalyst (0.91 V and 0.83 V vs. RHE). Next, the same catalyst was utilized as a energy storage material for supercapacitor with a specific capacitance value of 310 F/g at 0.5 A/g current density.
- Demonstration of potential of developed supercapacitor material through prototype fabrication for PV based sensor node application.

A Few Major Instruments Installed in Labs

Figure 01: Mesh sieves set

Figure 02: Thermal Imaging Camera

Figure 03: Francis Turbine

Figure 04: Pelton wheel Turbine

Figure 05: Plastic extruder (central workshop)

Figure 06: Thermocouple wire welder

Figure 07: Gas Chromatograph

Figure 08: pHcontroller with dosing pump

Figure 09: PH meter

Figure 10: TCLP

Figure 11: Air filtration test set up

Figure 12: Distilation assembly

Figure 13: Air Levitation (Tinkering Lab)

Figure 14: Tensegrity Stool (Tinkering Lab)

Figure 15: Heron's Fountain (Tinkering Lab)

Figure 16: Tesla Coils, Sound Sensor & Motion Sensor (Tinkering Lab)

Figure: 17: Magnetic stimers

Figure 18: Perisltaltic Pump

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- A Guleria, SK Gupta, I Gupta, D Swami, DP Shukla,2019 Understanding the spatial and temporal dependence of the migration of conservative contaminant plume in urban groundwater environment in Panchkula region, Haryana, India Groundwater for Sustainable Development 8, 93-103.

3.3 SCHOOL OF BASIC SCIENCES (SBS)

The School of Basic Sciences at IIT Mandi is a cluster of various disciplines of science such as Mathematics, Physics, Chemistry and Life Sciences and related domains. The core of the school consists of 37 faculties (plus visiting professor and teaching fellow) having expertise in contemporary fields of research. The school started its Ph.D. program in 2010 and presently 153 research scholars have enrolled to pursue research in various disciplines. The school aims to create an ambience for the smooth pursuit of scholarly activities in research and education to make an international impact. The school of Basic Sciences has started M.Sc. program in Chemistry with specialization in various areas such as Organic Chemistry, Inorganic Chemistry, and Physical Chemistry & Nano sciences fromYear 2014. The School of Basic Sciences has also started Integrated-Ph.D. Physics in year 2015, M.Sc. Mathematics & M.Tech. Biotechnology program in Year 2016 and M. Sc. Physics in 2017. The school had also started three new B.Tech. programs jointly with other schools. The faculty members of the school are closely working with the engineering colleagues on different research projects.

Faculty

1	**Dr. Syed Abbas** **Associate Professor & Chairperson,** Specialisation: Differential Equations and Ecological modelling PhD from Indian Institute of Technology Kanpur (2009) Home Town: Gonda, Uttar Pradesh Phone: 01905- 267148 Email: abbas Email: chairsbs	
2	**Dr. Aditi Halder** **Associate Professor** Specialization: Design and development of new functional nanomaterials for the application of renewable energy, nano-electronics and sensor PhD from Indian Institute of Science (2009) Home Town: Kolkata, West Bengal Phone: 1905-267140 Email: aditi	
3	**Dr. Ajay Soni** **Associate Professor** Specialisation: Nanomaterials and Experimental Condense Matter Physics PhD from UGC-DAE Consortium for Scientific Research, Indore (2009) Phone: 01905- 267135 Email: ajay	
4	**Dr. Amit Balkrishna Pawar** **Assistant Professor** Specialization: Organic Chemistry PhD from IISc Bangalore Home Town: Pune, Maharashtra Phone: 01905-267116 Email: amitpawar	

5	**Dr. Amit Jaiswal** **Assistant Professor** Specialization: Nano biotechnology PhD from Indian Institute of Technology Guwahati (2013) Home Town: Kolkata, West Bengal Phone: 01905-267137 Email: j.amit	
6	**Dr. Amit Prasad** **Assistant Professor** Specialisation: Immunology/Microbiology Phd from Sanjay Gandhi PG Institute of Medical Sciences, Lucknow (2008) Home Town: Ranchi, Jharkhand Phone:01905-267136 Email: amitprasad	
7	**Dr. Aniruddha Chakraborty** **Associate Professor** Specialisation: Theoretical Chemistry PhD from Indian Institute of Science (2005) Home Town: Kolkata, West Bengal Phone: 01905-267145 EMail: achakraborty	
8	**Prof. Arghya Taraphder** **Visiting Professor** Specialisation: Condensed matter physics Email: arghya	
9	**Dr. Arti Kashyap** **Associate Professor (Joint Appointment)** Specialisation: Magnetism and magnetic materials PhD from Indian Institute of Technology Roorkee Home Town: Mandi, Himachal Pradesh Phone: 01905-267042 Email: arti	
10	**Dr. Bhaskar Mondal** **Assistant Professor** Specialization: Computational Chemistry and Catalysis PhD from Indian Association for the Cultivation of Science, Kolkata Home Town: Basirhat, West Bengal Phone: 01905-267828 Email: bhaskarmondal	
11	**Dr. Bindu Radhamany** **Associate Professor** Specialization: X-ray spectroscopy PhD from UGC-DAE, consortium for scientific research, Indore (2005) Home Town: Kollam, Kerala Phone: 01905-267060 Email: bindu	

12	**Dr. Chayan K. Nandi** **Associate Professor** Specialisation: Physical Chemistry PhD from Indian Institute of Technology Kanpur (2006) Home Town: Sarangapur, Bankura, West Bengal Phone: 01905-267047 Email: chayan	
13	**Dr. C. S. Yadav** **Associate Professor** Specialisation: Low Temperature Physics PhD from Jawaharlal Nehru University (2008) Phone: 01905-267135 Email: Shekhar	
14	**Dr. Eike F. Schwier** **Adjunct Assistant Professor** Specialization: Surface Science, Photoelectron Spectroscopy, Density Functional Theory PhD from University of Fribourg, Switzerland Home town: Bremen, Germany	
15	**Dr. Garima Agrawal** **Assistant Professor** Specialization: Polymer Science and Technology, Materials Chemistry, Nanomaterials, Smart Materials, Biodegradable Polymers, Biomaterials PhD from RWTH Aachen University, Germany Home Town: Jaipur, Rajasthan Phone: 01905-267827 Email: garima	
16	**Dr. Girish Sharma** **Assistant Professor** Specialization: Theoretical condensed matter physics PhD from Clemson University (USA) Home Town: Shimla, HP Phone:01905- 267855 Email: girish	
17	**Dr. Hari Varma** **Associate Professor** Specialisation: Atomic and Molecular physics PhD from Indian Institute of Technology Madras (2008) Home Town: Kochi, Kerala Phone: 01905-267064 Email: hari	
18	**Dr. Kalpesh Haria** **Assistant Professor** Specialisation: Operator Theory PhD from IIT Bombay (2014) Home Town: Jamnagar, Gujarat Phone: 01905-267114 Email: kalpesh	

19	**Dr. Kaustav Mukherjee** **Associate Professor** Specialisation: Experimental Condensed Matter Physics PhD from UGC-DAE Consortium for Scientific Research (2008) Home Town: Kolkata, West Bengal Phone: 01905-267043 Email: Kaustav	
20	**Prof. Kenneth Gonsalves** **Visiting Distinguished Professor** Specialisation: Materials Synthesis PhD from University of Massachusetts at Amherst Home Town: Charlotte, NC, USA Phone: 01905-237976 Email: Kenneth	
21	**Dr. Manoj Thakur** **Associate Professor** Specialisation: Optimization, Soft Computing, Machine Learning & its Application to Computational Finance PhD from Indian Institute of Technology Roorkee (2007) Home Town: Roorkee, Uttarakhand Phone: 01905-267154 Email: manoj	
22	**Dr. Muslim Malik** **Associate Professor** Specialisation: Differential Equations PhD from Indian Institute of Technology Kanpur (2006) Home Town: Balrampur, UP Phone: 01905-267119 Email: muslim	
23	**Dr. Nitu Kumari** **Associate Professor** Specialisation: Differential Equations, Dynamical Systems, Nonlinear Dynamics PhD from Indian School of Mines Dhanbad (2009) Home Town: Dhanbad, Jharkhand Phone: 01905-267057 Email: nitu	
24	**Dr. Pradeep Kumar** **Assistant Professor** Specialisation: Raman and Infrared Spectroscopy PhD from Indian Institute of Science (2014) Home Town: Rohtak, HR Phone: 01905-267152 Email: pkumar	
25	**Dr. Pradeep Parameswaran** **Associate Professor** Specialisation: Inorganic/Materials/Nano-Chemistry PhD from University of Hyderabad (2006) Home Town: Varavoor, Thrissur District, Kerala Phone: 01905-237931/267045 Email: pradeep	

26	**Dr. Pradyumna Kumar Pathak** **Associate Professor** Specialisation: Quantum Optics, Quantum Information and Nano photonics PhD from Physical Research Laboratory, Ahmedabad Home Town: Mathura, Uttar-Pradesh Phone: 01905- 267046 Email: ppathak	
27	**Dr. Prasad Kasturi** **Assistant Professor** Specialization: Proteostasis, Aging, Stress Response and C.elegans PhD from University of Fribour Home Town: Nizamabad Phone:01905-267269 Email: prasadkasturi	
28	**Dr. Prasanth P. Jose** **Assistant Professor** Specialization: Soft condensed matter physics PhD from Indian Institute of Science (2005) Home Town: Palakkad, Kerala Phone: 01905-267064, Email: prasanth	
29	**Dr. Prem Felix Siril** **Associate Professor** Specialisation: Chemistry of Nanomaterials PhD from DDU Gorakhpur University (2003) Home Town: Thiruvananthapuram, Kerala Phone: 01905-267040, Email: prem	
30	**Dr. Prosenjit Mondal** **Assistant Professor** Specialisation: Molecular Endocrinology and Metabolism PhD from Institute of Life Sciences Bhubaneswar (2008) Home Town: Babunpur, Burdwan Phone: 01905-267135 EMail: prosenjit	
31	**Dr. Qaiser Jahan** **Assistant Professor** Specialisation: Harmonic and Wavelet Analysis PhD from ISI Kolkata (2014) Home Town: Allahabad Phone: 01905-267050 EMail: Qaiser	
32	**Dr. Rajanish Giri** **Assistant Professor** Specialisation: Biophysics and protein folding, Intrinsically Disordered Proteins, T Cell Engineering, Protein Engineering PhD from Sapienza University of Rome, Rome, Italy (2013) Home Town: Allahabad Phone:01905- 267154 EMail: rajanishgiri	

33	**Dr. Rajendra K. Ray** **Associate Professor** Specialisation: Computational Fluid Dynamics, Numerical Methods for PDEs PhD from Indian Institute of Technology Guwahati (2009) Home Town: Sainthia, West Bengal Phone: 01905- 267041 Email: rajendra	
34	**Dr. Sarita Azad** **Assistant Professor** Specialization: Statistical Time Series Analysis PhD from Delhi University and Indian Institute of Science (2008) Home Town: New Delhi Phone: 01905-267141 EMail: Sarita	
35	**Dr. Shyam Kumar Masakapalli** **Assistant Professor** Specialisation: Metabolic Systems Biology (Fluxomics and metabolomics), Plant and microbial metabolism, NMR and GC-MS. PhD from University of Oxford, UK (2012) Home Town: Rayagada, Odisha Phone: 01905-267147 Email: shyam	
36	**Dr. Subrata Ghosh** Associate Professor Specialisation: Organic Chemistry PhD from Indian Institute of Technology Guwahati (2006) Home Town: Bolpur-Santiniketan, West Bengal Phone: 01905-267065, Email: subrata	
37	**Dr. Suman Kalyan Pal** **Associate Professor** Specialisation: Fast and Ultrafast Laser Spectroscopy PhD from Indian Association for the Cultivation of Science, Jadavpur (2006) Home Town: Katwa, West Bengal Phone: 01905-267040 Email: suman	
38	**Dr. Tulika Prakash Yadav** **Associate Professor (Ramalingaswamy Fellow, DBT)** Specialisation: Bioinformatics, Systems Biology, Metagenomics, Comparative Genomics, Protein Function and Structural analysis Phd from IGIB, CSIR, Delhi (2005) Home Town: Delhi Phone: 01905-237922 Email: tulika	
40	**Dr. Venkata Krishnan** **Associate Professor** Specialisation: Materials Chemistry, X-ray Science PhD from University of Stuttgart, Germany (2006) Home Town: Coimbatore, Tamil Nadu Phone: 01905-267065 Email: vkn	

Faculty/Teaching Fellows		
41	**Dr. Ketaki Ghosh** **Teaching Fellow** Specialisation: Synthetic Organic Chemistry Ph.D.: IIT Kharagpur (2015) Home Town: Suri, Birbhum, WB Email: ketaki	
42	**Dr. Neha Garg** **DST INSPIRE Faculty Fellow** Specialisation: Cancer Biology, Stem Cells. PhD from Sapienza University of Rome, Italy (2013) Home Town: Delhi Phone: 01905-267155 Email: neha	
43	**Dr. Sweta Tripathi** **Ramalingaswami Faculty Fellow** Specialisation: Virology, Innate Immunity, Cancer Biology Ph.D.: Boston University Home Town: Gorakhpur Email: shwetatripathi	

Staff

1	**Anoop Kumar** Office Assistant Phone: +91-1905-267061 Email: sbsoffice@iitmandi.ac.in Office: Room no. 209-A3 Building	
2	**Alka** Office Assistant Phone: +91-1905-267061 Email: sbsoa1@iitmandi.ac.in Office: Room no. 209- A3 Building	
3	**Palvi Sharma** Technical Assistant Phone: +91-1905-267061 Email: palvisharma@projects.iitmandi.ac.in Office: Chemistry Lab- Ground Floor, A6 Building	
4	**Sushma** Project Associate Phone: +91-1905-267226 Email: sushma_verma@iitmandi.ac.in Office: Physics Lab – Ground Floor, A6 Building	

Research projects from IIT Mandi seed grants, sponsored projects, brief progress of the work done against project, highlighting the major achievements during this period. Names of PI, Co-PI, funding agencies and amount of grant received etc.

Sl. No.	Project Title	Sponsoring Agency	Principal Investigator & Coordinator(s)	School	Amount Sanctioned (in Rs.)	Duration
1	Effect of dimensionality on the electronic structure of some novel transition metal oxides	UGC-DAE	Dr. Bindu Radhamany	SBS	2,29,800	5 years
2	Immuno-modulating effect of Taenia solium cyst antigens on immune reactive cells and their role in pathogenesis	DBT	Dr. Amit Prasad	SBS	32,50,000	5 years
3	Physics of Electromagnos Dynamics Probed by Raman Scattering	DST-INSPIRE	Dr. Pradeep Kumar	SBS	35,00,000	5 years
4	Ramanujan Fellowship	SERB	Dr. Neha Garg	SBS	1,02,40,000	5 years
5	Development of Indigenous photoresists technology for semiconductor industries: impact on Indian economy, skilled manpower development and employment possibility	MHRD	Dr. Subrata Ghosh (PI) Dr. Satinder K. Sharma (Co-PI) Dr. Pradeep C. Parameswaran (Co-PI)	SBS	2,39,00,000	3.10 years
6	Integrating Genome scale metabolic analysis of model plant pathogen Ralstonia solanacearum with RNAseq and fluomics	DBT	Dr. Siddhartha Satapathy (Tezpur University) Dr. Shyam Masakapalli (IIT Mandi) Co-PI's Dr. Suvendra Ray(Tezpur University) Dr. Tulika Srivastava (IIT Mandi)	SBS	57,40,000	3 years
7	Mathematical Modelling of the Epidemiology of Multi-Drug Resistant Tuberculosis (MDR-TB)	SERB	Dr. Sarita Azad	SBS	18,25,725	3 years

8	Deciphering the molecular mechanisms governing the direct Aβ aggregation inhibition with the serum protein-Transferrin: Implication for Alzheimer's disease	DBT	Dr. Rajanish Giri(PI, IIT Mandi) Dr. Tamir Tripathi (Co-PI, North Eastern Hill University, Shillong)	SBS	70,33,000	3 years
9	A microfluidic based point of care testing device for measuring urine albumin using a novel organic dye	MHRD-IMPRINT	Dr. Shubhajit Roy Chowdhury(PI) Dr. Subrata Ghosh (Co-PI) Dr. Prosenjit Mondal (Co-PI)	SBS and SCEE	73,20,000	3 years
10	Improving Bio-engineering strategies to achieve soil stability	SERB	Dr. Kala Venkata Uday (PI) Dr. Shyam Kumar Masakapalli (Co-PI)	SBS and SE	51,33,040	3 years
11	Investigation of physical properties of multiferroic compounds belonging to double perovskites family	CSIR	Dr. Kaustav Mukherjee	SBS	10,00,000	3 years
12	Study of Nernst effect in the superconductors and semi-metallic compounds	SERB	Dr. C. S. Yadav	SBS	14,18,271	3 years
13	Study of magnetic and magnetocaloric properties of mixed metal oxides and rare-earth intermetallics	SERB	Dr. Kaustav Mukherjee	SBS	30,58,110	3 years
14	Engineering the electronic structure of possible oxide topological insulators	SERB	Dr. Bindu Radhamany	SBS	29,51,960	3 years
15	Nanoplasmonic SERS substrate design for trace analysis and detection	DAE-BRNS	Dr. Amit Jaiswal	SBS	24,99,400	3 years
16	Effect of correlation, relativistic interaction and confinement on the photoionization dynamics of atomic systems	SERB	Dr. Hari Verma	SBS	1,88,3750	3 years
17	Understanding intrinsically disordered proteins: Transactivation domains of cMyb and p53 from single molecule to ensemble and disease perspectives	DBT	Dr. Rajanish Giri (PI) Dr. Chayan K. Nandi (Co-PI)	SBS	70,29,200	3 years

18	Exploring the tunability of magnetic structure in multiferroic compounds YBa1-xSrxCuFeo5 (0≤ x≤ 0.6 and LnBaCuFeO5 (Ln = D, Ho, Yb) by employing temprature dependent neutron diffraction	UGC-DAE	Dr. C. S. Yadav	SBS	1,35,000	3 years
19	Role of human cathelicidine in gastric carcinogenesis	DBT	Dr. Shweta Tripathi	SBS	88,00,000	5 years
20	Immunotyping of Taenia solium functional secretome and their proteomic identification	SERB	Dr. Amit Prasad	SBS	53,85,397	3 years
21	Systems analysis of photoautotrophic metabolic phenotypes of plants in response to stress	SERB	Dr. Shyam Kumar Masakapalli	SBS	50,92,560	3 years
22	A comparative study on microscopic structure and dynamics near glass transition in linear polymer melt at low & high densities	SERB	Dr. Prasanth P. Jose	SBS	20,23,780	3 years
23	Sustainable waste water treatment through bio-photoelectro catalysis and bio production	MHRD-IMPRINT	Dr. Atul Dhar (PI) Dr. Rahul Vaish Dr. Shyam Kumar Masakapalli Dr. Aditi Halder Dr. Tulika P. Srivastava Dr. Rik Rani Koner	SBS and SE	3,84,34,000	3 years
24	Novel NIR-1 and NIR-2 dyes and their functionalised nanoparticles for non-invasive imaging, tracking and target delivery of Theranostics in progressive liver disease prognosis and therapy	DBT	Dr. Prosenjit Mondal (PI) Dr. Subrata Ghosh (Co-PI)	SBS	60,25,600	3 years
25	Development and dissemination of Agri-based technologies being optimized at IIT Mandi from lab to farmer's field of mid-Himalayan region	DST (WOS-B)	Dr. Reshma Sao (PI) Dr. Shyam Kumar Masakapalli (Mentor)	SBS	26,80,000	3 years

26	Photo- catalytic treatment of wastewater for the removal of Azo dyes: using rGO- TiO2 based cost effective composite technology	Himachal Pradesh State council for Science, Technology & Environment (SCSTE)	Dr. Satinder Kumar Sharma (PI), Dr. Venkata Krishnan (Co-PI)	SBS and SCEE	5,88,000	2 years
27	Spatial distribution of uranium and associated water quality parameters in groundwater, surface water and drinking water in four districts (Una, Bilaspur, Solan & Sirmour) the state of Himachal Pradesh	DAE-BRNS	Dr. Subrata Ghosh (PI) Dr. Jaspreet Kaur Randhawa (Co-PI)	SBS and SE	29,24,300	2 years
28	Spatial distribution of uranium and associated water quality parameters in Shimla and Kinnaur	DAE-BRNS	Dr. Venkata Krishnan (PI) Dr. Rik Rani Koner (Co-PI)	SBS and SE	29,24,300	2 years
29	Spatial distribution of uranium and associated water quality parameters in Mandi, Kullu and Hamirpur	DAE-BRNS	Dr. Dericks P Shukla (PI) Dr. Aditi Halder (Co-PI)	SBS and SE	27,51,800	2 years
30	Development of pristine graphene as a catalyst support	SERB	Dr. Prem Felix Siril (PI) Dr. Subrata Ghosh (Co-PI)	SBS	29,54,600	3 years
31	Smart Agriculture: Farmer Zone	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)	SBS, SCEE and SHSS	9,47,76,400	3 years

32	Development of two types of POST ETCH RESIDUE STRIPPERS suitable for cleaning and removal of residues after plasma etching & photo resist ashing of metal & dielectric layers	SCL Mohali	Dr. Subrata Ghosh	SBS	39,00,000	2 years
33	Translational research on cell-free DNA (cf-DNA) sensing pathways for early diagnosis and development of biomarker for sepsis	SERB	Dr. Avinash Singh (PI) Dr. Amit Prasad (Mentor)	SBS	19,20,000	2 years
34	Papping cellular metabolism of agricultural and industrial relevant Xanthomonas spp	SERB	Dr. Tanmoy Samanta (PI) Dr. Shyam Kumar Masakapalli (Mentor)	SBS	19,20,000	2 years
35	Development of an efficient numerical method for solving stochastic partial differential equation and its application to turbulent flow analysis	SERB	Dr. Rajendra Kumar Ray	SBS	20,09,918	3 years
36	Organic-Inorganic hybrids for Photochromic photocatalytic and antioxidant applications	SERB	Dr. Pradeep C. Parameswaran	SBS	39,44,600	3 years
37	Study of standard noncommuting and commuting dilations of commuting tuples	DST-INSPIRE	Dr. Kalpesh Jayantilal Haria	SBS	35,00,000	5 years
38	Curve crossing problems: Semi-analytical method for arbitrary coupling	CSIR	Dr. Aniruddha Chakraborty	SBS	2,49,833	3 years
39	Study of vector- borne diseases under the influence of environmental pollution	SERB	Dr. Nitu Kumari	SBS	22,28,160	3 years
40	Role of micro RNAs controlled by cmyc and Bmi1 in human glioma stem cells	SERB	Dr. Neha Garg	SBS	47,57,058	3 years
41	Uplifting hilly livelihood through the eco-friendly utilization of lantana weed	DST	Dr. Arti Kashyap	SBS	25,19,642	3 years
42	FIST for improvement of S & T infrastructure-FIST project	DST	Dr. Aditi Halder	SBS	1,12,00,000	5 years

43	Understanding the role of miRNAs and pattern recognition receptors mediated modulation of innate immune cells in neurocysticercosis	DBT	Dr. Amit Prasad	SBS	53,31,550	3 years
44	Development of decision support systems integrating parallel adaptive heruristic algorithms of large- scale multi-objective optimization problems for socio-economic and environmental planning	DST	Dr. Manoj Thakur (IIT Mandi) Dr. Andranik S Akopov (Russia)	SBS	26,20,400	2 years
45	Exciton manipulation in layered dichalcogenides-group II-VI semiconductor nanostructured materials	SERB	Dr. Dushyant Kushavah (PI) Dr. Suman Kalyan Pal (Mentor)	SBS	19,20,000	2 years
46	Implications of disordered regions in Zika virus capsid folding and functions	DBT-IYBA	Dr. Rajanish Giri	SBS	57,08,800	3 years
47	Study the dynamical evolution of spin and valley related many particle electronic states in two dimensional transition metal dichalcogenides using ultrafast time-resolved spectroscopy	SERB	Dr. Suman Kalyan Pal	SBS	35,00,716	3 years
48	Large unit cell materials with intrinsically low thermal conductivity for thermoelectric application	SERB	Dr. Ajay Soni	SBS	47,12,400	3 years
49	The role of ectopic liver derived systemic factors in regulating betacell function	DBT-IYBA	Dr. Prosenjit Mondal (PI) DBT	SBS	50,63,000	3 years
50	Modeling and control of the hinglish invasion in India: A mathematical study	SERB	Dr. Nitu Kumari	SBS	6,60,000	3 years

51	Developing novel strategies to capture Phytopathogen-agricultural host metabolic crosstalk by cell type specific 13 C metabolic phenotyping	MHRD-SPARC	Dr. Shyam Kumar Masakapalli as Principal Investigator (PI), Prof. Suvendra Kumar Ray and Dr. Siddhartha Sankar Satapathy (Co-PI's) from Tezpur University, and collaboration with Prof. George Ratcliffe (PI) and Prof. Nicholas Kruger (Co-PI) from University of Oxford, UK	SBS	46,81,775	2 years
52	Developing conducting polymer nanostructures and their nanocomposites as visible light photocatalysts for environmental remediation using flow chemistry	MHRD-SPARC	Dr. Prem Felix Siril as Principal Investigator (PI), Dr. Suman Kalyan Pal (Co-PI) from IIT Mandi, and collaboration with Prof. Samy Remita (PI) from Universite Paris- SUD and Dr. Chouki Zerrouki and Dr. Najla Fourati (Co-PI's) from Conservatoire National des Art et Maitiers de Paris	SBS	60,83,710	2 years
53	Biophysics of Zika virus envelope protein, membrane fusion and inhibitor discovery	MHRD-SPARC	Dr. Rajanish Giri as Principal Investigator (PI), Dr. Sanjeev Kumar Singh (Co-PI) from Alagappa University, and collaboration with Prof. Indira U. Mysorekar (PI) from Washington University in ST. Louis and Dr. Vladmir N Uversky (Co-PI) from University of Florida	SBS	97,23,515	2 years
54	Micronization and Encapsulation of explosive by expansion of CO2- expanded liquid solutions	DRDO	"Dr. Prem Felix Siril (PI) (IIT Mandi) Dr. Sameer Dalvi, IIT Gandinagar"	SBS	22,64,850	3 years

55	Design & synthesis of Cp* based half sandwich complexes of first row transition metals for sp2 and sp3 C-H activation	DST	Dr. Amit B. Pawar	SBS	10,07,703	5 years
56	Electron solvation by a layer of polar adsorbates realstic model	CSIR	Dr. Aniruddha Chakraborty	SBS	4,32,000	3 years
57	Designing functional nanomaterials for drug delivery	DST	Dr. Garima Agrawal	SBS	35,00,000	5 years
58	Identification of the Hedgehog pathway modulators in non-small cell lung cancer stem cells	DST-INSPIRE	Dr. Neha Garg	SBS	35,00,000	5 years
59	Development of Indigenous DUV photoresistsfor 180 nm process technology at Semi-conductor Lab (SCL) Mandi: Make in India SCL Mohali	ISRO	Dr. Subrata Ghosh	SBS	81,00,000	4.1 years
60	The role of hyperinsulinemia in the pathogenesis of insulin resistance and diabetes	SERB	Dr. Prosenjit Mondal	SBS	44,41,352	3 years
61	Development of indgenous chemical mechanical polishing slurries for microelectronics application at semiconductor laboratory (SCL)	SCL Mohali	Dr. Aditi Halder (PI) Dr. Venkata Krishnan (CO-PI: Dr. Rik Rani Koner (Co-PI)	SBS	69,60,000	3 years
62	Engineering novel plasmonic nanocapsules for cancer therapy and diagnostics	DBT	Dr. Amit Jaiswal	SBS	19,31,000	3 years
63	BioPEC: Cellulosic waste to high value products by integrating microbial bioprocessing and pyrolysis techniques	DBT-BMBF	Dr. Shyam Kumar Masakapalli (PI) Dr. Neil Mackinnon (PI) Dr. Swati Sharma (Germany)	SBS	45,46,000	2 years
64	Development of a hand held molecular point-of care test device for infectious diseases	DBT-IC	Dr. Rajanish Giri, Prof. Daman Saluja (University of Delhi) Prof. James Mahony (Canada)	SBS	98,25,000	2 years

65	Site specific forecasting based on sensor data using machine learning time series prediction modeling	DRDO	Dr. Manoj Thakur	SBS	26,06,400	2 years
66	Folding mechanism of trans activation domain of E2APBX1, an intrinsically disordered protein involved in leukemia induction	DST	Dr. Rajanish Giri (PI) Dr. Irina M Kuznetsova (Tikhoretsky St.-Petersburg Russia)	SBS	23,39,200	2 years
67	Magnetic properties and structure transformations in binary Fe- Pb and ternary Fe- Pd-M (M- Ni, Ga)	DST	Dr. Arti Kashyap (PI) Dr. Aleksandr Popov, M.N. Miheev Institute of Mental Physics, Russian Academy of Sciences, Yekaterinburg, Russia	SBS	19,86,400	2 years

Seed Grant Projects

S. No.	Proposal Title	Faculty name	Department /School	Amount Sanctioned (in Rs.)	Duration of Project
1	Inhabition of the Alzheimer's Aβ-Peptide Fibrillization by derived disordered peptides of Transthyretin: Molecular Mechanism by Atomic Force Microscopy	Dr. Rajanish Giri	SBS	7,00,000	3 Years
2	System Biology of selected Proteobacteria with idustrial, environmental and agricultural significance	PI- Dr. Shyam Kumar Masakapalli Co PI- Dr. Tulika P. Srivastava	SBS	18,00,000	3 Years

Women Centre In-House Project

S. No.	Principal Investigator	Title
1	Dr. Tulika P. Srivastava	EWOK - Enabling Women of Kamand

Dr. Kaustav Mukherjee

Spin–lattice relaxation phenomena in the magnetic state of a suggested Weyl semimetal CeAlGe: In this work, DC susceptibility, AC susceptibility and related technique, resistivity, transverse and longitudinal magnetoresistance and heat capacity measurement of a polycrystalline magnetic semimetal CeAlGe is carried out. This compound undergoes antiferromagnetic type ordering around 5.2 K (T1). Under the application of external magnetic fields, parallel alignment of magnetic moments is favoured above 0.5 T. At low field and temperature, frequency and AC field amplitude response of AC susceptibility indicate the presence of spin–lattice relaxation phenomena. The observation of spin–lattice interaction suggests the presence of the Rashba–Dresselhaus spin–orbit interaction which is associated with inversion and time-reversal symmetry breaking. Additionally, the presence of negative and asymmetric longitudinal magnetoresistance indicates anomalous velocity contribution to the magnetoresistance due to the Rashba–Dresselhaus spin–orbit interaction which is further studied by heat capacity.

Effect of partial substitution of iso-valent Mo at Cr-site on electronic structure and physical properties of Fe2CrAl: Heusler alloys Fe2Cr1-xMoxAl (x =0.05 and 0.15) have been synthesized and investigated focusing on the electronic structure, magnetic and magnetocaloric properties. Structural and morphological analysis suggests that all alloys crystallize in single phase cubic structure. Fe2Cr0.95Mo0.05Al undergoes ferromagnetic to paramagnetic phase transition near TC∼190 K, which is shifted to 160 K in Fe2Cr0.85Mo0.15Al. These values are smaller as observed in Fe2CrAl; this can be ascribed as the effect of increased hybridization between d states of Fe/Cr/Mo elements with Mo substitution. Interestingly, the increment of Mo substitution at Cr site in Fe2CrAl also causes an increase in the magnetic entropy change (ΔSM). Additionally, in low temperature regime of Fe2Cr0.95Mo0.05Al a cluster glass (CG) transition Tf∼ 3.5 K is noted which is shifted below 1.8 K in Fe2Cr0.85Mo0.15Al. This is ascribed as the effect of decreased magnetic anisotropy due to Mo substitution at Cr site in Fe2CrAl.

Magnetocaloric effect and spin-phonon correlations in RFe0.5Cr0.5O3 (R = Er and Yb) compounds: In this work investigation of the physical properties of mixed metal oxides RFe0.5Cr0.5O3 (R = Er and Yb) is carried out. ErFe0.5Cr0.5O3 undergoes an antiferromagnetic ordering around 270 K followed by two spin reorientation (SR) transitions around 150 and 8 K respectively. In contrast, in YbFe0.5Cr0.5O3 a single SR transition is noted at 36 K, below the antiferromagnetic ordering temperature of 280 K. In ErFe0.5Cr0.5O3, a significant value of magnetic entropy change (□SM) ∼ -12.4 J/kg-K is noted near the onset of 2nd spin-reorientation transition, however, this value is suppressed in YbFe0.5Cr0.5O3. Temperature dependent dielectric permittivity of ErFe0.5Cr0.5O3 and YbFe0.5Cr0.5O3 at different frequencies, reveal the presence of Debye-like relaxation behaviour in both the compounds. This type of behaviour has been attributed to the effect of charge carrier hopping between localized states of Fe and Cr ions in the presence of electric field. Temperature dependent Raman scattering studies divulge that spin-phonon coupling plays a crucial role in defining the physical properties of these compounds.

Dr. Bindu Radhamany
Project 1: IITM/UGC-DAE/BR/83:
Investigation of Mn 3d derived states in La0.2Sr0.8MnO3
Priyamedha Sharma, R.J. Chaudhary, D.M. Phase and R. Bindu
Mater. Res. Express 6 (2019) 086316

We have investigated the Mn 3d derived states in La0.2Sr0.8MnO3 to understand the temperature dependentspectral weight transfer observed in the valence band spectra. Towards this, we have used DFT and DFT+Ucalculations and x-ray and Mn 3p to 3d resonant photoemission spectroscopic techniques. Our results show that the calculation gives better representation of the experimental valence band spectra for on-site Coulomb interaction energy U=5 eV. The room temperature resonant photoemission technique reveal that the valence band feature ~2 eV is of mainly 3dnL character (L is the ligand hole formed by ligand to metal charge transfer) and the feature ~5 eV is predominantly of O 2p character. As the sample enters the low temperature tetragonal and insulating phase, the Mn 3d character of feature ~2 eV increases and of feature ~5 eV, it decreases.

Structural and electronic effects in GdCu alloy
Priyamedha Sharma, Jaskirat Brar, Bharath M and R. Bindu
2020 J. Phys.: Condens. Matter https://doi.org/10.1088/1361-648X/ab8427

We have studied structural and electronic phenomena in GdCu using x-ray diffraction (xrd), photoemissionspectroscopic (PES) techniques and band structure calculations. Our structural studies show that the as prepared GdCu sample does not stabilise completely in cubic CsCl phase even at room temperature (RT). The thermal hysteresis is observed in the lattice parameter that appears to be due to strain and dislocations at the surface. The behaviour of the intensity of the most intense xrd peak suggests phase coexistence and structural link with magnetic properties. After undergoing thermal cycling to RT, with increase in polishing depth, the GdCu sample shows different surface and bulk crystal structures at RT. This behaviour is in contrast to the behaviour of the as prepared one. The surface is predominantly cubic while the bulk exposes more its hidden orthorhombic FeB phase with increase in the depth of polishing. To understand the manifestation of phase separation on the electronic structure, we have used DFT and DFT+U calculations and PES studies. Our results show the importance of on-site Coulombic interaction in Gd 4f and Cu 3d orbitals. At the Fermi edge, in addition to the significant contribution of Gd 5d and Cu 3d there is also contribution of Cu 4p states. The PES studies exhibit chemical potential shift as one compares the as prepared GdCu and the GdCu that has undergone thermal cycling. We have discussed the effect of the chemical potential shift on the valence band and core level spectra. We believe our results will be helpful in providing insight into the generic property displayed by systems that exhibit strain dominated phase separation.

Project 2: IITM/SERB/BR/149
Interplay of lattice distortion and electronic structure in BaBiO3
M. Bharath, Priyamedha Sharma, Jaskirat Brar, R. K. Maurya and R. Bindu
J. Phys.: Condens. Matter 32 (2020) 055504

We have investigated room temperature core level and valence band spectra of BaBiO3 using x-ray photoemission spectroscopy and band structure calculations. The features in the valence

band spectrum were studied using Densityfunctional theory (DFT) under local density approximation (LDA) and Tran Blaha Modified Becke Johnson (TB mBJ) exchange potential. The calculations were performed for three different structural parameters; monoclinic, cubic andmonoclinic (M'). Our results of the core level spectrum and DFT calculations rule out charge disproportionation of the Biions. The valence band spectrum displays gap at the Fermi edge and fine structures in the region close to the Fermi edge.The DFT calculation under TB mBJ for the monoclinic structure is able to generate gap and match the energy positionsof the fine structure in a better way. Our calculation results show that there are holes in the O 2p states and unequaltransfer of electrons to the states of the Bi ions. Such mechanism could lead to bond disproportionation and itsassociation with the fine structures in the valence band. The current results reveal the significance of strong link betweenthe lattice distortion and electronic structure and hence to its physical properties.

Dr. Rajendra Kumar Ray

In our first work, we investigate the open channel turbulent flow using a stochastic concept based on informational entropy together with the maximum entropy principle. In the literature, it can be found that some researchers have uses Tsallis entropy theory for modelling velocity in open channels by hypothesizing an accurate cumulative distribution function (CDF) in the space domain. Here, we revisited the work on Tsallis entropy-based velocity distribution with particular attention to the role of the entropy index. Unlike the previous studies by Luo and Singh (2011), Singh and Luo (2011) and Cui and Singh (2013, 2014) on this topic, we explored the physical meaning of the index using a parameter estimation technique, namely the method of moments. In order to apply the method of moments, the second-order moment based on the conservation of momentum was used. It was found that the value of the entropy index greatly influences the velocity curve and should not be assumed a constant. In addition, the refined model was tested with some selected sets of laboratory and field data and also with the existing equation based on Tsallis entropy. The superiority of the proposed model was observed in the case of both 1D and 2D distributions of streamwise velocity. This work has been submitted to “Physica-A” and is currently under second revision. In the next work, we have formulated a mathematical model based on Tsallis entropy theory for the vertical distribution of streamwise flow velocity in open channels.

Earlier works (Luo and Singh (2011), Singh and Luo (2011) and Cui and Singh (2013, 2014) considered only the total probability and the mass conservation constraints; we have modified the study by incorporating all the required constraints. Considering the time-averaged normalized streamwise velocity as a random variable with a corresponding probability density function (PDF). Corresponding first-, second-, and third-order moments represent the hydrodynamic transport of mass, momentum, and energy, respectively. For deriving the analytical solution of the velocity equation, one may think of approximating the nonlinear term using the Taylor series expansion; however, it may not produce accurate results, as the approximation will depend on the order of magnitude of the Lagrange multipliers as well as the entropy index. To that end, the Padé approximant technique, which is considered to be the most accurate approximation of a function by a rational function of a given order, can be used. Using [3,3] Padé approximant for the nonlinear term, a relatively weaker nonlinear differential equation was obtained, which was then solved analytically using a non-perturbation approach known as the homotopy analysis method.

The solution was obtained explicitly, given the initial approximation to the solution is close enough. The convergence of the obtained series solution was shown both theoretically and numerically. For the numerical convergence, the squared residual error was calculated at each iteration. The Lagrange multipliers were obtained from the system of nonlinear equations obtained from the relations of PDF, first-, second-, and third-order moments. It can be noticed that the integrals in the form of constraints are not possible to obtain analytically. For that purpose, first, the integrals were approximated using the Gauss-Legendre quadrature rule, and then the system was solved using the Gauss-Newton method. The derived velocity profile was then validated with both the laboratory and the field data and also compared with the latest works in the area. Our steadies show that that the present model significantly improved the velocity profile as compared to the existing model. Moreover, to get a quantitative idea about the prediction accuracy of velocity equations, relative error (RE) and root-mean-square error (RMSE) were calculated for all the models, and it was observed that the present model is superior to the other model.

Dr. Syed Abbas

- Received Matrices Grant, 2020.

Dr. Ajay Soni

- DST-SERB Core Research Grant (EMR-Individual Centric), by Science and Engineering Research Board (SERB), Delhi, India; Total Grant: INR 47,12,400.

- Indo-Sweden Joint Network Grant in Collaboration with Prof P. Eklund, Linkoping University, Sweden, supported by Department of Science and Technology (DST), India and Swedish Research Council,Sweden.

Dr. Prosenjit Mondal

- DBT- BT/PR27786/MED/30/1980/2017 March,2019- March,2022
  Title: The Role of Ectopic Liver Derived Systemic Factors in Regulating Beta-cell. Function.Budget:INR. 50,61,000 Role on Project:Principal Investigator.
  Funding agency- DBT
  Co-PI: Rajesh Ghosh, SE, IIT Mandi
- SERB: File Number: CRG/2019/004006
  Feb,2020- Feb,2023
  Title: Function and Mechanisms of sorcin in diet induced fatty liver diseases and lipid metabolism.
  Budget: INR. 43,60,000
  Role on Project: Principal Investigator Funding Agency: SERB.
  Co-PI: Subrata Ghosh, SBS, IIT Mandi.

Dr. Kalpesh Haria

Funding Agencies – DST
Amount Grant Received - Every Year Rs. 7,00,000
Amount Spent – Rs. 3,31,325

Dr. Garima Agarwal

DST Inspire Project sponsored by Department of Science & Technology
Project transferred from IIT Roorkee to IIT Mandi in February 2020

Funds sanctioned for financial year 2019-2020: INR 7,00,000
Amount spent: INR 1,84,890 at IIT Roorkee; Expenditure at IIT Mandi still need to be processed according to the extended financial year.

Dr. Bhaskar Mondal
Seed grant:
A combined Computational-Experimental research proposal entitled "Rational Design and Development of Cyclopentadienyl-Based Cobalt Catalysts for Selective C–H Activation" has been submitted with Dr. Amit B. Pawar, Assistant Professor, IIT Mandi for the seed grant.
Amount: 10 Lakhs
Status: Submitted on 31st January 2020.
External funding:
A research proposal entitled "Computational Design of Non-Noble Metal Catalysts for Photocatalytic N2 Activation" has been submitted to the SERB Start-Up Research Grant (SRG) program for funding.
Grant amount: 30 Lakhs
Status: Submitted on 1st March, 2020.

Dr. Trayambak Basak
Extramural approved grant:
Indian Council of Medical Research (ICMR) extramural ad-hoc application (Proposal ID 2020-1249)- "High-resolution plasma proteomic and lipidomic analyses for fibrosis-related metabolic assessment in dilated cardiomyopathy (DCM) patients in India: A Multi-Center based study". PI: Trayambak Basak, Proposed budget: ~44 lakhs, Duration- 3 years. (Status: Technically Approved: Awaiting Budget release)
Seed grant:
Deciphering the cardio myocyte specific signalling networks during fibrosis. PI: Trayambak Basak, Duration- 3 years. (Status: Submitted)

Dr. Girish Sharma
Submitted the following research proposals:
(i) DST-SUPRA proposal for Rs. 45 lakhs.
(ii) IIT Mandi seed grant for Rs. 10 lakhs.
(iii) DST-SRG proposal for Rs. 26 lakhs.

Dr. Aniruddha Chakraborty
Our project entitled "Electron solvation by a layer of polar adsorbates - realistic model" is approved by Council of Scientific and Industrial Research (CSIR), New Delhi, India (4.32 Lakh). P.I.: Dr. A. Chakraborty.
Summary: An electron near a metal surface feels the charge of its image in the metal and therefore it moves under the influence of this attractive potential. Harris et. al., reported an experimental study of the dynamics of electron in image states of a metal surface having polar adsorbate on it - they find two kinds of states, viz., one localized and the other delocalized. There have been attempts to model the process, but the problem is the nature of the image potential state is not known owing to the lack of detailed knowledge of the geometry of the metal surface. All the theoretical calculations done so far have used flat metal surface. In this project we will consider a model in which we account for non-flatness of the surface.

Book Chapters Published

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- Dr. Garima Agarwal: Guest editor for the special issue titled "Advanced Nano/Micro Materials for Drug Delivery Applications" in Journal of Nanomaterials 2020, Hindawi publisher.
- Theoretical Approach to Homoge-neous Catalytic Reduction of CO2: Mechanistic Understanding to Build New Catalysts, L. Roy, B. Mondal, F. Neese, S. Ye, Electrochemistry of CO2, Royal Society of Chemistry. Status: In Press, 2020.
- Subit K Jain, Jyoti Yadav, Manisha Rao, Monika Sharma, Rajendra K Ray; A Nonlinear Telegraph Equation for Edge-Preserving Image Restoration, In: Das A., Nayak J., Naik B., Pati S., Pelusi D. (eds) Computational Intelligence in Pattern Recognition, Advances in Intelligent Systems and Computing, vol 999, Springer, Singapore.
- V. Sharma, A. Kumar and V. Krishnan, Two Dimensional MXene based Heterostructures for Photo-catalysis (Chapter 12) in Handbook of Smart Photocatalytic Materials: Environment, Energy, Emerging Applications and Sustainability, C. M. Hussain and A. K. Mishra (Eds.), Elsevier Publishers, Netherlands, 2020, 1, 247-257.(https://www. sciencedirect. com/ science/ article/pii/B9780128190494000192).
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  (https://www.sciencedirect.com/science/article/pii/B9780128185988000067).

Dr. Muslim Malik

Sl. No.	Title	Author's name	Publisher	Year of Publication
1.	Some Oscillatory Results for Nonlinear Equation on Time Scales.	Shekhar Singh Negi, Syed Abbasand Muslim Malik	Springer, Singapore	2020
2.	Existence and Ulam's Type Stability of Integro Differential Equation with Non -instantaneous Impulses and Periodic Boundary Condition on Time Scales.	Vipin Kumar and Muslim Malik	Springer	2019

Papers Published in reputed National Journals

- Subit K Jain and Rajendra K Ray; Non-linear diffusion models for despeckling of images: achievements and future challenges, IETE Technical Review. (https://doi.org/ 10.1080/ 02564 602.2019.1565960).
- SS Negi, S Abbas, M Malik; Periodic solutions of the N-preys and M-predators model with variable rates on time scales; Indian Journal of Pure and Applied Mathematics.

Paper Published in reputed International Journals

- Shree M, Masakapalli SK* (2018) Intracellular Fate of Universally Labelled 13C Isotopic Tracers of Glucose and Xylose in Central Metabolic Pathways of Xanthomonas oryzae. Metabolites, 8, 66 (*corres-ponding).
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- R Dhayal, M Malik, S Abbas, A Debbouchi; Optimal Controls for Second Order Stochastic Differential Equations Driven by Mixed Fractional Brownian Motion with Impulses; Mathematical Methods in the Applied Sciences.
- SS Negi, S Abbas, M Malik, SR Grace; New oscillation criteria for p-Laplacian dynamic equations on time scales; Rocky Mountain Journal of Mathematics.

Paper accepted in reputed Inter-national journals

- R Dhayal, M Malik, S Abbas; Solvability and optimal controls of non-instant-aneous impulsive stoch-astic fractional differential equation of order $q \in (1, 2)$; Stochastics, 1-23, 2020.
- S Singh Negi, S Abbas, M Malik; A generalized delta derivative on time scale with applications; Mathe-matical Methods in the Applied Sciences, 2020.
- S Dhama, S Abbas, R Sakthivel; Stability and Approximation of Almost Automorphic Solution on Time Scales for Stochastic Nicholson's Blowflies Model; Journal of Integral Equations & Appli-cations
- S Dhama, S Abbas; Permanence, exis-tence, and stability of almost automorphic solution of a non. autonomous Leslie-Gower prey– predator model with control feedback terms on time scales; Mathe-matical Methods in the Applied Sciences, 1-14.
- R Dhayal, M Malik, S Abbas, A Kumar, R Sakthivel; Approximation theorems for controllability problem governed by fractional differential equation; Evolution Equations & Control Theory, 2020.

National Conferences Attended and Papers Presented

- Priyamedha Sharma, R Rawat, R Bindu; Electronic structure study of GdCu, AIP Conference Proceedings 2115 030355 (2019) NCES'19 (invited talk).
- Bharath M and Bindu R, Structure and properties of BaBiO3 and Ba1-xYxBiO3-delta International con-ference on Advanced Material 2019 (Poster presen-tation).
- Dr. Girish Sharma: Novel phases of quantum matter, ICTS, Bangalore.
- Dr. Aniruddha Chakraborty: Delivered an invited talk at the 3rd North West Meeting on Spectro-scopy, Structure and Dynamics at Indian Institute of Technology Roorkee, Uttarakhand, India (5 - 7 April, 2019).
- Dr. Chayan K. Nandi: One-day discussion meeting on spectroscopy photonics and dynamics organized by Centre for advanced and Functional materials (CAFM), IISER Kolkata, 7th March 2020.
- Afsal Thuppilakkadan, Jobin Jose and Hari R. Varma; Photoionization studies of argon inside charged fullerene. 8th Topical Conference of the Indian Society of Atomic and Molecular Physics(ISAMP), IIT Roorkee. March 3-5, 2020.
- Gurpreet Kaur and K. Mukherjee; Magnetic studies of caged compound DyFe2Al10, DAE Solid State Physics Symposium: Dec 2019, IIT Jodhpur, Rajasthan, India.

- Kavita Yadav and K. Mukherjee; Effect of Co substitution on magnetic properties and electronic structure of a Heusler alloy Fe2CrAl, DAE Solid State Physics Symposium: Dec 2019, IIT Jodhpur, Rajasthan, India.
- Karan Singh and K. Mukherjee; Spin-lattice relaxation phenomena and multiple magnetic phase in a semimetal CeAlGe, International conference on Strongly Correlated Electron System: Sept. 2019, Okayama, Japan.

International Conferences Attended and Papers Presented

- Dr. Amit Balkrishan Pawar: Attended "International Conference on Organo-metallics and Catalysis" from 7th-10th March 2020. During this conference, delivered flash presen-tation and presented poster.
- Published a paper in Nature group Journal: Paving the path to the future of Carbogenic nanodots" Navneet C. Verma, and Chayan K. Nandi Nature Commun 10, 2391, 2019.
- E. Butkevich, N. C. Verma, N. Oleksiievets, I. Gregor, C. F. Schmidt, J. Enderlein, C. K. Nandi and A. CHizhik. Carbon dots for studying muscle architecture. ACS Appl. Nano Mater.2019, 2, 7466-7472.
- Graphitic Carbon Coated Magnetite Nanoparticles for Dual-Mode Imaging and Hyperthermia" Asish Tiwari, Navneet C. Verma, Sibel Turkkan, Ayan Debnath, Anup Singh, Gerald Draeger, Chayan K, Nandi. J. K. Randhawa, ACS Appl. Nano Mater.3, 896-904, 2020.
- Chayan K Nandi, Unique Fluorescent Nanodots as a marker for correlative super resolution microscop". ICANN-2019, 18-21st Dec 2019, IIT Guwahati.
- Chayan K Nandi, "Paving the Path to the Future of Carbogenic Nano Dots", Chemical Research Society of India (CRSI), IIT Kanpur, 19-21st July 2019.
- Chayan K Nandi, "Dual responsive fluorescent Nanodots for simultaneous use in super resolution and electron microscopy" Single molecule sensors and nanosystems; S3IC 2019", Munich Germany, 3-5th April 2019.
- Chayan K Nandi, Unique Fluorescent Nanodots as a marker for correlative super resolution microscope". ICANN-2019, 18-21stDec 2019, IIT Guwahati.
- Chayan K Nandi, "Paving the Path to the Future of Carbogenic Nano Dots", Chemical Research Society of India (CRSI), IIT Kanpur, 19-21st July 2019.
- Chayan K Nandi, "Dual responsive fluorescent nanodot for simultaneous use in super resolution and electron microscopy" Single molecule sensors and nanosystems; S3IC 2019", Munich Germany, 3-5th April 2019.
- N. M. Hosea, J. Jose, H. R. Varma; Photoionization studies of 3s orbital of sodium atom. International conference on Atomic, Molecular, Optical and Nano Physics with Applications (CAMNP 2019), Delhi Technological University, New Delhi, Dec. 18-20, 2019.
- Rasheed Shaik, Hari Varma, Himadri Chakraborty; Effects of exchange-correlation functional on the structure and the photoionization dynamics of Na40 cluster. 50th Annual Meeting of the APS Division of Atomic, Molecular and Optical Physics APS Meeting (DAMOP 2019), May 27–31, 2019; Milwaukee, Wisconsin.
- R Shaik, H R Varma, H S Chakraborty; Effects of exchange-correlation functional on the structure and the photoionization dynamics of Na40 versus Na92 cluster. 31st International Conference on Photonic, Electronic and Atomic Collisions (ICPEAC XXXI), July 23 - 30, 2019; The Deauville International Center, Normandy, France.

- Afsal Thuppilakkadan, Hari R. Varma; Photoresponse studies of Ar and K+ conned in neutral and charged Fullerenes. 31st International Conference on Photonic, Electronic, and Atomic Collisions (ICPEAC XXXI), July 23 - 30, 2019; The Deauville International Center, Normandy, France.
- Kavita Yadav and K. Mukherjee; Magnetic and magnetocaloric properties of Ru-substituted YbFe0. 5Cr0.5O3, 3rd International Conference on Condensed Matter and Applied Physics: Oct 2019, Bikaner, India.
- Nishith Mohan and Nitu Kumari (2019) "Turing Patterns in a Cross Diffusive System." Book Chapter, International Conference on Recent Advances in Pure and Applied Mathematics. Springer, Singapore.
- Nitu Kumari and Shubhangi Dwivedi (2020) Fundamental Concepts of Synchronization an Introduction: From Classical to Modern, Reso-nance Vol. 25 (4), 539-566.
- Rajendra K. Ray, Atendra Kumar; Higher order compact numerical simulation of forced convection from an isothermal square cylinder in shear flow, 9th International Congress on Industrial and Applied Mathe-matics (ICIAM 2019), 15-19 July 2019, Valencia, Spain.
- Pankaj, Rajendra K. Ray; Higher Order Compact Simulation of Unsteady Natural ConvectionIna Square Cavity with Bottom Undulations, 64th Congress of the Indian Society of Theoretical and Applied Mechanics (ISTAM -2019),9-12 December 2019, IIT Bhubaneswar, India.
- Rajendra K Ray, Amarjit Haty;A Numerical Study of Forced Convection from a Circular Cylinder with Time Periodic Pulsating Temperature in a Uniform Flow, 64th Congress of the Indian Society of Theoretical and Applied Mechanics (ISTAM -2019), 9 -12 December 2019, IIT Bhubaneswar, India.
- Ashwani, Rajendra Kr. Ray; Compu-tational Study of Shear Flow Past Square Cylinder with Horizontal Control Plate, 7th International Congress on Computational Mechanics and Simulation (ICCMS 2019), 11 – 13 December 2019, IIT Mandi, India.

Invited Lecturers/Talks/Continuing Education Programs

Dr. Ajay Soni

Invited Talks

- "Soft Phonon Modes and Thermal Transport Properties of Doped Tin Telluride", Invited talk by Dr. Ajay Soni in three-day thematic workshop on "Physics at Low temperatures and High magnetic fields (LTHM)" held at UGC-DAE Consortium for Scientific Research, Indore during May. 29-31, 2019.
- "Soft Phonon Modes and Thermal Transport Properties of Doped Tin Telluride", Invited Talk in DAE-BRNS Solid State Physics Symposium, held at IIT Jodhpur, during 18-22, December 2019.

Dr. Kalpesh Haria

- Given a talk in the 34th Annual Conference on Ramanujan Mathematical Society during August 1-3, 2019 at Department of Mathematics, Pondicherry University.
- Given a talk in the Conference on Functional Analysis @ IIT Bombay- 2019 during October 17 - 20, 2019 at Department of Mathematics, IIT Bombay.
- Given an invited talk in international conference ICMMCMSE-2020 during January 22-24, 2020 at Alagappa University, India.

- Given an invited talk in National conference MAS-2019 during December 17-18, at IIT(ISM) Dhanbad, India.
- Given an invited talk in International conference CMA-2019 during November 12-14, 2019 at IIT Indore, India.
- Given an invited talk as a resource person in Faculty development program on "Scientific tools in research methodology" during 7–9 August 2019 at Poornima Institute of Engineering & Technology, Jaipur, India.
- Given an invited talk in international conference ICMMAAC-2019 during August 8-10, 2019 at JECRC University Jaipur, India.

Dr. Venkata Krishnan

- Delivered an invited talk at North Easter Hill University (NEHU), Shillong, Meghalaya, India on Feb. 06, 2020.
- Participated and delivered an invited talk at the International Conference on Nanomaterials for Energy, Environment and Sustainability (ICNEES 2019) held at Siksha 'O' Anusandhan, Bhubaneswar, Odisha, India from Dec. 20 to 22, 2019.
- Participated and delivered an invited talk at the International Conference on Chemical Constellation Cheminar (CCC-2019) held at National Institute of Technology Jalandhar, Punjab, India from Oct. 12 to 13, 2019.
- Participated and delivered an invited talk at the Second XPS Workshop: Fundamentals and Recent Advancements in Surface Analysis at Hyderabad, India from Sep. 28 to Oct. 01, 2019.
- Delivered an invited talk at SRM Institute of Science and Technology, Kattankulathur, Tamil Nadu, India on Jun. 4, 2019.

Workshop/ Conference Organized

Local Organizers: K. Mukherjee, C. S. Yadav, P. Kumar, S. K. Pandey. "Discussion Meeting on Recent Advances in Magnetism (DMRAM)" on 14-16 May, 2019: The meeting was arranged for fostering ideas and deeper understanding of the emerging aspects of fundamental and applied magnetism, a current frontier area in condensed matter physics research. In this meeting at IIT Mandi, total participants were 70 which included 20 external participants from different Indian institutions.

Dr. Muslim Malik

- Convener of "International conference on difference equations and control problems" during 17-19 June 2019, IIT Mandi.

Dr. Rajendra Kr. Ray

- Instructional School for Teachers (IST) on "Partial Differential Equations: From Theory to Computation", 3 – 15 June 2019, IIT Mandi, India.

- Workshop on "Vedic Mathematics", 19 – 22 June 2019, IIT Mandi, India.

Professional Achievements, Honours and Awards

Dr. Kalpesh Haria

- Received "Teaching Honour Roll Award" on the occasion of Teacher's Day 2019 at IIT Mandi for significant contribution to student learning through excellence in teaching during the academic year-2018-19.

Dr. Chayan K. Nandi

- Chemical Research Society of Indian Bronze Medal 2019.

Membership of Professional Societies

Dr. SKM: Member of American Society of Microbiology (ASM)
- Founding member of Biological Engineering Society, India.

Dr. Trayambak Basak: Proteomics Society of India
- American Society of Matrix Biology.

Dr. Amit Prasad
- Life member of 1. Indian Association of Parasitology.
- Translational Biomedical Research Society of India.
- Member: American Society of Parasitologist.

Dr. Chayan K. Nandi
- Lifetime member Materials Research Society of India.

Dr. Rajendra Kr. Ray
- Outreach member, Society for Industrial and Applied Mathematics (SIAM).
- Life member, Calcutta Mathematical Society (CMS).
- Life member, Indian Mathematical Society (IMS).
- Life member, Indian Society of Theoretical and Applied Mechanics (ISTAM).

Visit to Academic Institutes and Lectures Delivered

Dr. Ajay Soni

- "Thermal transport properties of chalcogenide materials: Role of structural defects and advantages", Institute talk at SN Bose center for Basic Sciences, Kolkata, on December 31st, 2019.

Dr. Kalpesh Haria

- I visited Prof. Jaydeb Sarkar, ISI Bangalore, in July-August 2019 and in Nov-2019
- I visited Dr. Santanu Sarkar, IIT Ropar, in December 2019 and February-2020.

Dr. Trayambak Basak

- Delivered an invited lecture entitled "Deciphering site-specific collagen post-translational modifications using high-resolution Mass Spectrometry" at the 11th Proteomics Society of India Annual Conference at National Dairy Research Institute, Karnal, Haryana.

Dr. Muslim Malik

- Visited IIT Kanpur for collaborative work with professor D. Bahuguna during 29-31 December, 2019.

Dr. Pradeep Kumar

- Delivered an invited lecture at IIT Jodhpur in symposium on 2D Materials and Devices.

Dr. Kalpesh Haria

- I visited Prof. Jaydeb Sarkar, ISI Bangalore, in July-August 2019 and in Nov-2019
- I visited Dr. Santanu Sarkar, IIT Ropar, in December 2019 and February-2020.

Dr. Trayambak Basak

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- Visited IIT Kanpur for collaborative work with professor D. Bahuguna during 29-31 December, 2019.

Dr. Pradeep Kumar

- Delivered an invited lecture at IIT Jodhpur in symposium on 2D Materials and Devices.

Outreach Activities

Dr. Shyam K. Masakapalli

- Activities conducted in IIT Mandi-Industry-EWOK-Farmer Network.
- Supported startups in Agriculture (Thapasu foods – IIT Mandi Catalyst startup).
- Hosted Himalayan Drug Company- Bangalore for exploratory visit towards empowering local farmers via EWOK network.
- Trained women from EWOK – Tea Packaging.
- Organised Botanical Garden tours of several local (about 7) schools, Girls students of Vigyan Jyoti conference held at IIT Mandi, MIT Boot camp students.
- Plantation Drives - 5WIP and NSS.
- Handson workshop for Northeast STEP students – Botanical Garden visit and DNA from plants.

Dr. Trayambak Basak

- Delivered a short lecture on "Understanding the building block of cells using next-generation tools" and interacted with the students and teachers from Chandigarh University, Mohali as outreach activity on 2nd March 2020.
- Delivered a short lecture on "Collagens- the most abundant protein in the human body" and interacted with the students and teachers from Vallabh college, Mandi as outreach activity on 6th November 2019.
- I have presented a research seminar in-front of the M. Tech (Biotechnology) students on 20th November 2019.

Any Other Information

Dr. Prosenjit Mondal

- Vineeth P Daniel (PhD student) got best poster award at All India Cell Biology Conference 2019 (AICB) @ IISER Mohali 19th -21st December, 2019 conducted by The Indian Society of Cell Biology (ISCB).

Dr. Muslim Malik

- My PhD student Vipin Kumar awarded the Raman-Charpak-fellowship program in France during January 15 - July 15, 2020.

3.4 SCHOOL OF HUMANITIES AND SOCIAL SCIENCES (SHSS)

2019-2020 was an year of high-points for the School of Humanities and Social Sciences. It arrived on the world stage with the award of the Infosys Prize in Humanities to Dr. Manu V. Devadevan in 2019. Although, any other achievement seems to fade besides this one, they are no less.The School expanded its breadth with the joining of three new faculty members in 2019. The year also saw faculty members receive substantial funding from different funding agencies like DST, ICSSR, MHRD-SPARC, RX Data Science, USA, and so on. They also published books with reputed publishers like SAGE, Cambridge University Press, among others, and papers in prestigious journals. The Master's students of the pioneering batch of M.A. Development Studies went out to the field to get the first-hand experience of the ground realities in their quest to better understand the developmental issues that the country faces in this millennium. Besides, the School also hosted its first national conference at IIT Mandi in December 2019: the 17th Annual Conference of the Indian Association for Social Sciences and Health. In the year ahead, the School looks forward to graduate its first batch of Master's students, consolidate its standing in the academic circles, and achieve greater heights, all within the broader vision of the Institute, of building an inclusive and just society.

Faculty

Dr. Suman **Assistant Professor & Chairperson** Specialization: Colonialism, Post colonialism, Imperialism and Romance Literature PhD from IIT Delhi. Home Town: Faridabad Phone: 01905-267919 Email: suman.sigroha	**Dr. Aruna Bommareddi** **Assistant Professor** Specialisation: Comparative Literature, Indian Literatures in English PhD from University of Hyderabad Home Town: Hyderabad, Andhra Pradesh Phone: 01905-267121 Email: aruna
Prof. Balasundaram Subramanian **Adjunct Professor** Specialisation: German Studies and Political Philosophy Ph.D in German Studies in 1981 Home Town: Velachery, Chennai Phone: 01905-267114 Email: bs	**Dr. Devika Sethi** **Assistant Professor** Specialization: Modern Indian History, Colonialism and Decolonization, Free Speech and Censorship PhD from Jawaharlal Nehru Uni versity, New Delhi Home Town: Allahabad, Uttar Pradesh Phone: 01905-267270 Email: devika
Dr. Ingrid Shockey **Adjunct Associate Professor** Specialization: Environmental Sociology PhD from Brandeis University Home Town: Northampton, MA, USA	**Dr. Manu V. Devadevan** **Assistant Professor** Specialization: Literary practices in South Asia, Political and Economic Processes in premodern South Asia & South Asian Epigraphy PhD from: Mangalore University, Mangalagangothri, Mangalore. Phone: 01905-267147 Email: manu

Dr. Neha Kaushik **Assistant Professor** Specialization: Translation Studies, Women's Writing, Comparative Linguistics, German Studies PhD from Jawaharlal Nehru University Home Town: New Delhi Phone: 01905-267267 Email: nehakaushik	**Dr. Nilamber Chhetri** **Assistant Professor** Specialization: Sociology PhD from Jawaharlal Nehru University, New Delhi Home Town: Kalimpong, West Bengal Phone: 01905-267079 Email: nilamber
Dr. Puran Singh **Assistant Professor** Specialization: Corporate Finance, Microfinance PhD from Punjab University Home Town: Mandi, Himachal Pradesh Phone: 01905-267916 Email: puran	**Dr. Rajeshwari Dutt** **Assistant Professor** Specialisation: Latin America, Social and Cultural History Ph.D. From Carnegie Mellon University (USA) Home Town: Kolkata, West Bengal Phone: 01905-267043 Email: rdutt
Dr. Ramna Thakur **Assistant Professor** Specialization: Development Economics PhD from HPU Shimla Home Town: Mandi Phone: 01905-267044 Email: ramna	**Dr. Saumya Dixit** **Assistant Professor** Specialization: Post consumption consumer behaviour, e-waste management, e-wom management PhD from IIIT Allahabad Home Town: Allahabad, Uttar Pradesh Phone: 01905-267049 Email: saumya
Dr. Shyamasree Dasgupta **Assistant Professor** Specialization: Energy and Environmental Economics, Economics of Climate Change, Applied Econometrics PhD from Jadavpur University Home Town: Kolkata, West Bengal Phone: 01905-267122 Email: shyamasree	**Dr. Surya Prakash Upadhyay** **Assistant Professor** Specialization: Sociology of Religion, Urban Sociology, Post-Reform India PhD from Indian Institute of Technology Bombay Home Town: Lucknow, Uttar Pradesh Phone: 01905-267136 Email: surya
Dr. Varun Dutt **Assistant Professor (Faculty Affiliate)** Specialization: Judgment and Decision Making, Environmental DecisionMaking, Artificial Intelligence, Human-Computer Interaction Ph.D. from Carnegie Mellon University (USA) Home Town: Lucknow, Uttar Pradesh Phone: 01905-267041 Email: varun	**Prof. Venkataraman Ranganathan** **Visiting Distinguished Professor** Specialization: Economics, Energy, Environment & Climate Change PhD from IIM Ahmedabad Home Town: Bengaluru Phone: 01905- 267174 Email: ranga
Mr. Gokul Somasekhran **Teaching Fellow** Specialization: German Literature Pursuing PhD from Free University Berlin Home Town: Thrissur, Kerala Phone: 01905-267144 Email: gokul	

Research Projects

Externally Sponsored Research Projects

S. No.	Project Title	Sponsoring Agency	Principal Investigator & Co-ordinator(s)	Amount Sanctioned (in Rs.)	Duration of Project
1	Role of AADHAAR in improved last mile delivery of banking service: A Study of Himachal Pradesh	Digital Identity Research Initiative	Dr.Puran Singh	43,45,380	1.6 Years
2	Documentation of Successful case studies of Initiatives for water Conservation under MGNRERS	NIRD & PR	Dr.Ramna Thakur	2,49,700	2 Months
3	Socio-economic profile of tribes of Himachal Pradesh	Tribal 145 Development Department, Himachal Pradesh	Dr.Ramna Thakur(PI) Dr. Rajeshwari Dutt (Co-PI)	5,00,000	1.6 Years
4	Area deprivation and the prevalence of non-communicable diseases: Analysis at the block level in Punjab	MHRD-SPARC	Dr.Ramna Thakur as Principal Investigator (PI), Dr. Rajeshwari Dutt & Dr.Chander Singh (Co-PI's) from IIT Mandi, and collaboration with Prof. Martin Siegel (PI) from TechnischeUniversitat Berlin and Dr. Warner Maier (Co-PI) from Helmholtz-Zentrum Munich	60,88,190	2 years
5	Do health policies require to address gender related unique needs to control non-communicable disease in India	ICSSR	Dr. Ramna Thakur	10,00,000	2 years
6	Primogeniture in the ColdDesertofIndian Himalayan Region: A FadingReality	Ministry of Culture, Government of India	Dr.Ramna Thakur	5,00,000	1 year
7	Time and Motion Study of MGNREGA in Himachal Pradesh	Department of Rural Developm	Dr.Ramna Thakur and Dr. Rajeshwari Dutt	19,98,000	1.5 years
8	Smart Agriculture: Farmer Zone	DBT	Dr.Srikant Srinivasan (PI), Dr.Shyamasree Dasgupta (one of the Co-PI's) from IIT Mandi	7,16,00,000 (Share of Dr. Shyamasree is 15,00,000)	3 years

9	Vulnerability profiles for India: State and district level	DST	Dr.Shyamasree Dasgupta	80,51,832	6 Months
10	Capacity Building on Climate Change Vulnerability Assessment in States of Indian Himalayan Region	Swiss Development Corporation (SDC)	Dr.Shyamasree Dasgupta	18,84,562	1.4 year
11	A study of the intersections of oral history and religon for sustainable development in the fragile himalayas located in Himachal Pradesh	ICSSR	Dr. Suman Sigroha	5,00,000	2 years
12	Deployment of sensors for landslide monitoring and early warning	Deputy Commissioner office Mandi (H.P.)	Dr. Varun Dutt (PI) Dr. K.V. Uday (Co-PI)	2,99,750	1 year
13	Development and Deployment of low- cost landslide monitoring and warning system in district Sirmaur (H.P.)	Deputy Commissioner office Sirmaur, HP	Dr.Varun Dutt & K V Uday	4,01,500	1 year
14	Development of Human-Performance Modeling Framework via Physiological and Signal Processing Tools for Visual Cognitive Enhancement in IVD,VR and AR Paradigms	DRDO	Dr. Varun Dutt	22,62,850	3 year
15	Evaluation of quantitative systems pharmacology and machine learning models for blood glucose prediction	RX Data Science USA	Dr. Varun Dutt	15,26,400	2.5 years
16	A game theoretic approach involving experimentation and computational modelling of hacker's decision using deception in cyber security	DST-ICPS	Dr. Varun Dutt (P.I), Dr. V.S.C PammiCBCS,University Allahabad	31,00,000	3 years
17	Public perception of air pollution and the development and testing of a low-cost air pollution sensing and warning system	DEST, HP	Dr. Varun Dutt (P.I), ER. Pratik Chaturvedi DTRL, DRDO	6,79,679	2 years
18	Development and evaluation of low-cost landslide early warning solutions	DRDO-DTRL	Dr. Varun Dutt (P.I), Dr. Venkata Uday Kala(Co-PI) SE	9,99,460	3 years
19	Development and evaluation of low-cost landslide monitoring solutions	NDMA	Dr. Varun Dutt (P.I), Dr. Venkata Uday Kala (Co-PI) SE	27,85,080	3 years

Details of Research Grants/Seed Funding from the Institute

S. No.	Title of Proposal	Name of Faculty	Department/School	Amount Sanctioned (in Rs.)	Duration of Project
1	The Kangra Earthquake (1905): A Social and Political History	Dr. Devika Sethi	School of Humanities & Social Sciences	5,00,000	3 years
2	Financial Inclusion and Financial Deepening Through Branchless Banking in Himachal Pradesh	Dr. Puran Singh (PI)	School of Humanities & Social Sciences	5,00,000	2 years
3	Comprehensive Valuation of Forest Ecosystem Services and Understanding the Method of Value Formation: A case Study in Himachal Pradesh	Dr. Shyamasree Dasgupta	School of Humanities & Social Sciences	5,00,000	3 years
4	Institutions of Technology and Language Instruction	Dr. Aruna Bommareddi	School of Humanities & Social Sciences	5,00,000	3 years
5	Transitioning to E-autos in Hill States: A Case Study in Mandi Town	Dr. Shyamasree Dasgupta, Dr. Narsa Reddy and Dr. Rajan Kapur	School of Humanities & Social Sciences, School of Computing & Electrical Engineering, and School of Basic Sciences	23,80,000, (5,00,000 for Dr. Shyamasree)	2 years
6	Mayans in 19th Century Mexico & Belize	Dr. Rajeshwari Dutt	School of Humanities & Social Sciences	6,20,0000	5 years

PUBICATIONS

Books Published

- Bommareddi, Aruna. Narrative Traditions of a Telugu Epic: Paln□tiv□rula Katha. Madras, Notion Press, 2019.
- Bommareddi, Aruna (Ed). Fingerprints of Creativity. Hyderabad: Regional Printing Press, 2019.
- Devika Sethi ,War over Words: Censorship in India, 1930-60 (Cambridge University Press, 2019).
- Rajeshwari Dutt, Empire on Edge: The British Struggle for Order in Belize during Yucatan's Caste War, New York: Cambridge University Press, 2020.
- Singh, K. and Sigroha, S. Eds. Translational Research and Applied Psychology in India. SAGE, 2019.
- Sigroha, S. (Forthcoming 2020). Some Wild Growing Food Plants of Kamand. Kamand Valley Monograph, IIT Mandi.

Book Reviews

- Manu V Devadevan (2020). 'From the 14th Century, a Political Satire for All Times,' Review of Jyotirmaya Sharma, The Ocean of Mirth: Reading Hasyarnava Prahasanaṁ of Jagadesvara Bhattacharya, A Political Satire for All Times, Routledge, London and New York, 2020 (https://thewire.in/books/from-the-14th-century-a-sanskrit-political-satire-for-all-times), The Wire, 9 January 2020.
- Manu V Devadevan (2019). Review of Whitney Cox, Politics, Kingship, and Poetry in Medieval South India: Moonset on Sunrise Mountain, Indian Economic and Social History Review, Vol. 52, No. 2, 2019, pp. 230-232.
- Dutt, Rajeshwari (2019). Murder in Mérida, 1792: Violence, Factions, and the Law. By Mark W. Lentz. Albuquerque: University of New Mexico Press, 2018. Pp. 328. $95.00 cloth; $29.95 paper. The Americas vol. 76, no. 4, Cambridge University Press.

Opinion Pieces

- Manu V Devadevan (2020). 'Fasisattinre Kanappurannal,' (In Malayalam), Navamalayali, 17 January 2020.

Book Chapters

- Manu V Devadevan,'Knowing and Being: Kutiyattam and Its Semantic University,' in David Shulman and Heike Oberlin (eds), Two Masterpieces of Kutiyattam: Mantrankam and Anguliyankam, Oxford University Press, New Delhi, 2019, pp. 275-305.
- Manu V Devadevan,'Temple and Territory in the PuriJagannathaImaginaire,' in Shonaleeka Kaul (ed), Eloquent Spaces: Meaning and Community in Early India, Routledge, London and New York, 2019, pp. 105-128.
- Devadevan, M. V. (2018). Clio and Her Descendants: Essays for KesavanVeluthat. Delhi: Primus.
- Dasgupta, S., Chakraborty, D. and Roy, J (2020). Selected Issues in Economics of Greenhouse Gas Emission Mitigation in Majumdar, B (Ed). Reference Module in Materials Science and Materials Engineering. Vol 9. Elsevier.
- Sankhyan, Neeraj and Sigroha, Suman.Salvaging Nature from Ruins of Development in Mamang Dai's Poetry. In Global Perspectives on Eco-Aesthetics and Eco-Ethics: A Green Critique.Edited by KrishanuMaiti and Soumyadeep Chakraborty. pp. 157-168, (2019), Rowman & Littlefield.
- Sigroha, S. and Kamlesh Singh. Introduction: Laying the Groundwork - Translational Research and its Role in Applied Psychology, in Translational Research and Applied Psychology in India. SAGE.
- Singh, K. and Sigroha S. Conclusion: Psychology and Translational Research - The Way Ahead, in Translational Research and Applied Psychology in India. SAGE.

National Conference Proceedings

- Shyamasree Dasgupta, Panel of Climate Vulnerability Assessment in the Indian Himalayan Region in the 10th Biennial Conference of Indian Society of Ecological Economics held at Centre for Economic and Social Studies, Hyderabad (6-8 Nov, 2019).
- Shyamasree Dasgupta,Climate vulnerability and risk assessment in the Indian Himalayan Region- paper presented in C2E2 Himalaya 2019 at IIT Mandi (18-20 April, 2019).
- Presented a paper titled, "Assessing exposure from cooking with solid fuels and respiratory diseases among different socio-demographic groups in India", at 8th Annual Conference of the Indian Health Economics and Policy Association (IHEPA) held at National Institute of Science Education and Research (NISER) Bhubaneswar during January 23-24, 2020.
- Presented a paper titled, "Analyzing the socio-economic differentials in out-of-pocket (OOP) health expenditure and coping behavior on infectious diseases in India: Evidence from 71st round", at 17th annual conference of Indian Association for Social Sciences and Health held at Indian Institute of Technology Mandi, 8-10th December, 2019.
- Attended a workshop on capacity building under 'Pradhan Mantri Van Dhan Yojana (PMVDY) on Research and Development at Tribal Cooperative Marketing Development Federation of India (TRIFED), Ministry of Tribal Affaires, Government of India, 14th November, 2019.

Papers in International Journals

- Zahid Maqbool, Varun Dutt 4(1), 2019. Behavioural Cyber security: Investi-gating the influence of patching vulnerabilities on cyber decision-making via cognitive modelling, Journal of Cyber Situation Awareness.
- Medha Kumar, Varun Dutt, 34(4), 503-526, 2019; Alleviating misconceptions about Earth's climate: Evidence of behavioural learning in stock-and-flow simulations, System Dynamics Review.
- Palvi Aggarwal, Varun Dutt, In press, 2020; Role of information about opponent's actions & intrusion-detection alerts on cyber-decisions in cyber security games.
- Zahid Maqbool, Palvi Agarwal, V. S. Chandrasekhar Pammi, Varun Dutt, 11(11), 2020; Cyber Security: A Peer-Reviewed Journal Cyber Security: Effects of Penaliz-ing Defenders in Cyber-Security Games via Experimen-tation and Computational Modeling Frontiers in Psychology: Cognitive Science.
- Akash K Rao, Jibraan Singh Chahal, Sushil Chandra, Varun Dutt, In press, 2020;Virtual-reality training under varying degrees of task complexity in a search-and-shoot scenario Lecture Notes in Computer Science.
- Palvi Agarwal, Aksh Gautam, Vaibhav Agarwal, Cleotilde Gonzalez, Varun Dutt, 109-121, 2019; HackIT: A Human-in-the-loop Simulation Tool for Realistic Cyber Deception Experiments Advances in Human Factors in Cybersecurity, Springer
- Pratik Chaturvedi, Varun Dutt, 300-310, 2019; Influence of social norms on decision-making against landslide risks in interactive simulation tools, Advances in Human Factors and Simulation, Springer
- Prasanti Ganesh, Medha Kumar, Varun Dutt, 2019; How people make mitigation and adaptation decisions against climate change with descriptive or experiential information, In Annual Conference of Cognitive Science.

- Medha Kumar, Kapil Agarwal, Varun Dutt , 26-33, 2019; Modeling Decisions in Collective Risk Social Dilemma Games for Climate Change using Reinforcement Learning, In IEEE Conference on Cognitive and Computational Aspects of Situation Management (CogSIMA), Las Vegas, Nevada, USA.
- Shruti Kaushik, Abhinav Choudhury, Pankaj Kumar Sheoran, Nataraj Dasgupta, Sayee Natarajan, Larry A. Pickett, Varun Dutt, 3(4), 2020; AI in Healthcare: Time-Series Forecasting using Statistical, Neural, and Ensemble Architectures, Frontiers in Big data: Medicine and Public Health.
- Praveen Kumar, Priyanka Sihag, Ankush Pathania, Shubham Agarwal, Uday K V, Varun Dutt, In press, 2020; Landslide Debris-flow prediction using ensemble and non-ensemble machine learning methods, Contributions to Statistics, Springer Nature. Naveksha Sood, U Rani, S Swaminathan, G Abraham, Varun Dutt, In press, 2020; Applications of statistical and machine learning methods for predicting time series performance of network devices Contributions to Statistics, Springer Nature.
- Shruti Kaushik, Abhinav Choudhury, Nataraj Dasgupta, Sai Natarajan, Larry A. Pickett, Varun Dutt, In press, 2020; Evaluating autoencoder and principal component analysis for feature engineering in electronic health records, Contributions to Statistics, Springer Nature.
- Shruti Kaushik, Abhinav Choudhury, Nataraj Dasgupta, Sai Natarajan, Larry A. Pickett, Varun Dutt In press, 2020 Evaluating single- and multiheaded neural architectures for time-series forecasting of healthcare expenditures, Computational Intelligence Theoretical Advances/Applications, De Gruyter Press.
- Shruti Kaushik, Abhinav Choudhury, Nataraj Dasgupta, Sai Natarajan, Larry A. Pickett, Varun Dutt In press, 2020; Ensemble of Multi-headed machine learning architectures for time-series forecasting of healthcare expenditures, Elements of Statistical Learning, Springer Nature.
- Naresh Mali, Pratik Chaturvedi, Uday K V, Varun Dutt , 449-452, 2019;Training of Sensors for Early Warning System of Rainfall Induced Landslides,Recent Advances in Geo-Environmental Engineering, Geomechanics and Geotechnics, and Geohazards.
- Praveen Kumar, Priyanka Sihag, Ankush Pathania, Shubham Agarwal, Pratik Chaturvedi, Uday K V, Varun Dutt, In press, 2020; Predictions of weekly slope movements using moving-average and neural network methods: A case-study in Chamoli, India,In 9th International Conference on Soft Computing for Problem Solving, Liverpool, UK.
- Ankush Pathania, Praveen Kumar, Jyoti Kesri, Priyanka, Shubham Agarwal, Naresh Mali, Uday K V, Varun Dut , 144 -158, 2019; Reducing Power Consumption of Weather Stations for Landslide Monitoring, Information Technology in Geo-Engineering, Springe.
- Shruti Kaushik, Abhinav Choudhury, Varun Dutt, In press, 2020; Predicting daily medicine expenditures via a variance-based generative adversarial network, In Women in Machine learning workshop co-located with Neural Information Processing Systems (NeurIPS) 2019, Vancouver, Canada.
- Praveen Kumar, Priyanka Sihag, Ankush Pathania, Pratik Chaturvedi, Uday K V, Varun Dutt, Accepted, 2020; Comparison of Moving-average, Lazy, and Information Gain Methods for Predicting Weekly Slope-movements: A Case-study in Chamoli, India,World Landslide Forum-5, Kyoto, Japan.

- Ankush Pathania, Praveen Kumar, Priyanka Sihag, Mohit Kapoor, Aakash Maurya, Varun Dutt, Accepted, 2020; Predictions of soil movements using Persistence, Auto-regression, and Neural network models: A case-study in Mandi, India, International Conference on Paradigms in Computing, Communications and Data Sciences.
- Ankush Pathania, Praveen Kumar, Priyanka Sihag, Pratik Chaturvedi, Uday K V, Varun Dutt, 2020 Accepted ; A Low Cost, Sub-Surface IoT Framework for Landslide Monitoring, Warning, and Prediction, ACCESS, 2020.
- Shivendra Sangar, Varun Dutt, Ramna Thakur, 7, 9, 2019; Comparative Assessment of Economic Burden of Disease in relation to out-of-pocket expenditure, Frontiers in public health.
- Shivendra Sangar, Varun Dutt, Ramna Thakur, 1-10, 2019; Coping with out-of-pocket health expenditures in India: Evidence from NSS 1st Round, Global Social Welfare.
- Shivendra Sangar, Varun Dutt, Ramna Thakur, 23(1), 314-330, 2019;Distress financing of out-of-pocket health expenditure in India, Review of Development Economics.
- Rushil Singhal, Avinash Kumar, Sunny Zafar, Varun Dutt, In press, 2019; Evaluating statistical approaches for tool condition monitoring in drilling applications Operations Management and Systems Engineering, Springer Nature.
- Rushil Singhal, Avinash Kumar, Sunny Zafar, Varun Dutt, In press, 2020; Predictive models for tool-condition monitoring using statistical approaches, In 6th International Con-ference on Production and Industrial Engineering, Jalandhar, India.
- Sethi, D. (2019). 'Alarmist stories and defeatist views': Censorship and morale in India during the Second World War. War in History, 26(2), 250-264. (Published in April 2019).
- Singh, Puran and Kaur Harleen (2019). Zenatix: Discovering Market Fit. Ivey Publishing, 9B19A019, 11p. https:// www.iveycases.com/ProductView.aspx?id=102444
- Sankhyayan, P. and Dasgupta, S. (2019). 'Availability' and / or 'Affordability': What matters in household energy access in India? Energy Policy. 131 (2019) 131–143 (Elsevier) https://www. science direct.com/ science/article/pii/S030142151930268X
- Dasgupta, S., Chakraborty, D. and Roy, J (2020). Selected Issues in Economics of Greenhouse Gas Emission Mitigation in Majumdar, B (Ed). Reference Module in Materials Science and Materials Engineering. Vol 9.Elsevier. https://www. science direct.com/science/article/pii/B9780128035818110562?via%3Dihub
- Manu V. Devadevan. 'Sivasaranara Vacanagala Mularupa,' (In Kannada), Itihasa Darpana, No. 40-41, 2019, pp. 81-92
- Manu V. Devadevan. 'Visvasahitya: Parikalpaneya Savalugalu,'(In Kannada), Sangata, No. 7, 2019, pp. 7-12.
- Khare, A., Dixit, S., & Sarkar, S. (2019). Factors affecting website continuance intention: a study of Indian travel websites. Information Technology & Tourism, 1-29.
- Khare, A., Dixit, S., & Sarkar, S. (2020). Antecedents to Online Travel Purchase: Role of Network Benefits, Pilgrimage Packages, Interactivity, Trust and Customer Reviews. Journal of Quality Assurance in Hospitality and Tourism, 1-26.
- Dutt, Rajeshwari (2019) "Art in the Teaching of World History in the STEM Classroom: India's Institutes of Technology as a Case Study." World History Connected vol. 16, no. 3. University of Illinois Press.
- Somasekharan, Gokul: „Im Spannungsverhältniszwischen Universalismus und Relativismus: Der Dilettan-talssymptomatische Krisenfigur der Modernebei Rudolf Kassner", in: Jahrbuch der Goethe-Gesellschaft (Indien), 2020 (accepted).

- Faizan, M. A., & Thakur, R* 2019, Measuring the impact of household energy consumption on respiratory diseases in India. 4(1), 10. Global Health Research and Policy (BMC).
- Sangar, S., Dutt, V., & Thakur, R.* 2019, Distress financing of out-of-pocket health expenditure in India. 23, 314-330, Review of Development Economics, (Wiley).
- Sangar, S., Dutt, V., Thakur, R.* 2019, Economic burden, impoverishment, and coping mechanisms associated with out.of.pocket health expenditure in India: A disaggregated analysis at state level in India, 34(1), e301–e313, International Journal of Health Planning and Management, (Wiley).
- Sangar, S., Dutt, V., & Thakur, R.* 2019, Burden of out-of-pocket health expenditure and its impoverishment impact in India: evidence from National Sample Survey. 1-18, Journal of Asian Public Policy, (Taylor & Francis).
- Sangar, S., Dutt, V., & Thakur, R.*, Comparative assessment of economic burden of disease in relation to out of pocket expenditure. 7(9), Frontiers in Public Health (Frontiers).
- Sangar, S., Dutt, V., & Thakur, R.* (2019), Rural–urban differentials in out-of-pocket health expenditure and resultant impoverishment in India: evidence from NSSO 71st Round, 3(1), 273-291 Asia-Pacific Journal of Regional Science, (Springer).
- Sangar, S., Dutt, V., & Thakur, R.* 2019, Coping with out-of-pocket health expenditure in India: evidence from NSS 71st round;1-10, Global Social Welfare, (Springer).
- Faizan, M.A., & Thakur, R.*, 2019, Association between solid cooking fuels and respiratory disease across socio-demographic groups in India; 9(23) ,Health and Pollution, WHO funded journal.
- Sangar, S., Dutt, V., & Thakur, R*2019, Why people avoid prescribed medical treatment in India?; ,2(63), 151-153, Indian Journal of Public Health.
- Saxena, V. and Sigroha, S. The Ordinary and The Extreme: Second World War in Young Adult Fiction set in Asia. XIV, n. 2, 695 – 712, (2019). History of Education & Children's Literature.

International Conferences

- Dutt Rajeshwari (2019, July), "Being 'Indian' in the post-Emancipation Transatlantic World: The Case of Mosquito Shore in Nicaragua in the Nineteenth Century". Transatlantic Studies Association Conference, University of Lancaster.
- Devika Sethi, Presented paper titled 'Do revolutionary ideas have an expiry date? Two cases from late colonial India' at an international conference titled Nihil Obstat: Reading and Circulation of Texts After Censorship (17-18 October 2019) at New York University Prague.
- Dhandhi, M. and Sigroha, S. Translating Gender and Children's Lore: Reading Haryanvi Folk-texts through translation. The 2nd International Conference on Indigenous Languages: Towards Sustainable Multilingualism, IIT Madras. Chennai, 2020.
- Dhandhi, M. and Sigroha, S. Reading Translation as a Subjective Process and Dismissing its Universality Through a Haryanvi Short Story in Translation. The International Conference on Langua-ging and Translating: Within and Beyond, Department of Humanities and Social Sciences, IIT Patna in association with CIIL Mysuru and Yonphula Centenary College, Royal University of Bhutan. Patna, 2020.

- Priyadarshini, A. and Sigroha, S. Resistance and Reclamation of Palestinian Memory in Leila Abdelrazaq's Baddawi. National Conference on Conflict and Everyday Life, IIT Jammu. Jammu, 2020.
- Suman Sigroha. Myths from the Himalayan Hills in India as the Bearers of Ecological Knowledge in the panel, "Other Worlds, Different Humans: Indigenous and Traditional Myths as Ecological Knowledge" at the Thirteenth Biennial Conference of the Association for the Study of Literature and Environment (ASLE). University of California, Davis, June 2019.[Virtual presentation].
- Yadav, S., Rohith, A., Ramanathan, R., and Sigroha, S. Understanding Strategies of Sustainable Development by Means of Oral History in Himachal Pradesh. International conference on Heading Towards Zero: Sustainable Development in Economy, Environment and Society, Central University of Haryana, Haryana. Mahendergarh, 2019.

Professional Achievements, Honours and Awards

- Manu V. Devadevan, awarded Infosys Prize in Humanities for the year 2019.
- Rajeshwari Dutt, awarded TSA Palgrave MacMillan Research Award given by Transatlantic Studies Association USA in July 2019.
- Rajeshwari Dutt, selected as an Associate Editor, Itinerario: Journal of Imperial and Global Interactions (Cambridge University Press), 2020-2025.
- Area Editor, selected as an Area Editor, The Americas: A Quarterly Review of Latin American History (Cambridge University Press), 2020-2025.
- Varun Dutt, selected a member of the editorial board of Management and Business Review (MBR) journal.
- Varun Dutt, selected as an Associate Editor to the Frontiers in Cognitive Science Journal.
- Varun Dutt, selected as an Editor for the special issue on "Human decision-making in combat situationsinvolving traditional and immersive technologies" in Frontiers in Cognitive Science Journal.
- Varun Dutt, selected as a member of editorial board in Journal on Cyber Situational Awareness.
- Varun Dutt is a founder and director of Intiot Services Pvt. Ltd., India.
- Varun Dutt, selected as a member of the board of governors, RxDataScience Inc., USA.

Grant/Fellowships/Memberships of Professional Societies

- Indian Council of Social Science Research, Grant for Data Collection Abroad, 2019, Dr. Rajeshwari Dutt.
- Member,International Association for Energy Economics, Dr. Shyamasree Dasgupta.
- Member, The International Society for Ecological Economics, Dr. Shyamasree Dasgupta.
- Member, British Association for South Asian Studies (BASAS), Dr. Devika Sethi.
- J. GondaFellowship for residence at the International Institute for Asian Studies, Leiden, from 3 January 2020 to 1 February 2020, Manu V. Devadevan.
- Internationale Vereinigungfür Germanistik, Palermo 2020, for participation at the International Congress of Germanists to be held at University of Palermo, July 26-31, 2021, Gokul Somasekharan.

Invited Lecturers/Continuing Education programs

- Devika Sethi, Lecture series titled 'Transition of the Royal Indian Marine to Indian Navy: Milestones and Achievements' to cadets and officers of the Indian Naval Academy (INA), Ezhimala, Kerela, April and October 2019 (via National Knowledge Network NKN Virtual Classroom).
- Shyamasreee Dasgupta,training Session on "Methods of Collection of Quantitative Data" in the pre-conference workshop on research methods in social sciences organized by Indian Association for Social Sciences and Health and IIT Mandi. 5-7th December 2019.
- Shyamasree Dasgupta, panellist of the session on "Vulnerability Assessment in the Indian Himalayan States" in the "Himalayan Summit on Climate Change" held on November 27 & 28, 2019 at Dr Ambedkar International Centre, Janpath, New Delhi, as part of the 10th CMS VATAVARAN – International Film Festival and Forum on Environment & Wildlife.
- Shyamasree Dasgupta,"Energy Access and Sustainable Development: A case of lighting and cooking fuel demand in India"– Distance talk delivered for Asian University for Women, Bangladesh (1st July 2019).
- Suman Sigroha, training Session on "Writing Research Proposal" in the pre-conference workshop on research methods in social sciences organized by Indian Association for Social Sciences and Health and IIT Mandi. 5-7th December 2019.

Workshops and Conferences

- A 4-day capacity building and training workshop on Vulnerability Assessment involving ~60 participants from 18 states (government departments and academic institutes) under the ongoing funded project. 12-15 February, 2020 in New Delhi. In collaboration with IIT Guwahati, IISc Bangalore, Swiss Agency for Development and Cooperation and Department of Science and Technology.

- Organization of a 2-day dissemination workshop on Climate Change related Vulnerability Assessment of the Indian Himalayan Region. 14-15 March, 2019 in New Delhi. In collaboration with IIT Guwahati, IISc Bangalore, Swiss Agency for Development and Cooperation and Department of Science and Technology.

- Given the issues concerning the health status, behavior and health care system in India, there is a need to critically analyze various inter-connected issues pertaining to health, gender and development, with a view to develop useful perspectives and approaches. It is important for social scientists working in this field to debate and discuss on the possibilities for evolving suitable mechanisms to interlink research, practice, and policy. The 17th Indian Association for Social Science and Health (IASSH) conference provided the much-needed platform for social researchers to present their views and ideas, thereby making significant contributions towards a better understanding of the inter-relationship between health, gender, well-being and socio-economic development. Another goal of this conference was to encourage youth participation in the knowledge transfer in social sciences and health research, to promote inter-disciplinary research in the field of health studies and to assess current status and best practices in relation to application of social sciences in health promotion.

- Dr. Ramna Thakur (Convenor) and Dr.Shyamasree Dasgupta (Co-convenor), organized the 17th annual conference of Indian Association for Social Sciences and Health held on Health, Gender and Development: Emerging Issues and Challenges, at Indian Institute of Technology Mandi, 8-10th December, 2019.
- And, conducted a workshop on 'Research methods in Social Sciences' at Indian Institute of Technology Mandi, 5-7th December, 2019.

- Workshop on 'Village Studies in India: Historical Overview and Methodological Issues' by Dr. Rinki Sarkar (March 2019) – organized in capacity as Coordinator, ISTP, IIT Mandi, Dr. Devika Sethi.
- Varun Dutt delivered a guest lecture at the 11th International Conference on Intelligent Human-Computer Interaction at Indian Institute of Information Technology, Allahabad on 13/12/2019.
- Varun Dutt delivered a guest lecture at the HPSDMA workshop.

Talks Organized

Speaker	Affiliation	Title ofthe Talk	Date
Dr. Shweta Garg	Dhirubhai Ambani Institute of Information & Communication Technology, Gandhinagar	Gendering Public Policy	13th March 2020 (Journey of a Woman Artist)
Prof. Sudhir Chopra		Precautionary Approach in the Rights of Nature: A Discussion	5th March 2020
Dr. Arik Moran	University of Haifa	Kingship and Polity in Himalayan Borderland: Rajput Identity in early colonial encounter	24th October 2019
Dr. Anant Maringanti	Director, Hyderabad Urban Lab	Empaneling the Urban Lab	31st October 2019
Prof. Sushil Mittal	James Madison University, Virginia, US	Comparative Religion: Hindu/Gandhian Perspective	23rd April 2019

MA in Development Studies with Field Study as a component

The first Masters Programme by SHSS was launched in 2018 in the form of MA in Development Studies. The intake of the first batch was 12 and they came from all over the country and had varied disciplinary backgrounds. The programme aims to create a pool of development practitioners and/or academics, who will be well equipped to participate in the process of such informed decision making. The location of the Institute will also provide the programme with a unique

opportunity to deal with development challenges in the Himalayan region, which has both local, regional and global relevance.

To suit the aim of the programme, students, other than taking up core and discipline related courses, also had to take up 2 group projects, named “Development Studies Practicum” and a mandatory “Field Study” during the summer term (3-4 weeks during June-July, 2019). The first task of a development practitioner is to ‘diagnose’ the problem on the ground, to understand the ‘socio-economic nuances’ of the problem and to have a thorough understanding of the ‘agencies’ who are already working on the ground. For this 4-credit course “Field Study”, this year the students stayed in remote rural local, with the community in many cases. This course is expected to help students to learn how to diagnose the development challenges and get the praxis right.

Five students went to different locations of Chattishgarh and Jharkhand as volunteers under Road Scholars initiative of Sahpati volunteering programme (2019). The projects were mostly meant to improve the education system and food security of PVTGs (Particular Vulnerable Tribal Groups) of the mentioned locations.

Two students went to Poothurai Village, Villupuram in Tamil Nadu through an NGO named Gramonnati Trust. The NGO works on organic farming.

Two students went to various villages of Yavatmal district in Maharashtra. They worked with an NGO called GraminSamassya Mukti Trust and focused on the natural resource management and livelihood of the area.

One student went to several villages in Jhajjhar district in Haryana. She was a part of the research group from Centre for Research in Rural and Industrial Development, Chandigarh. She focussed on the gender issues and elderly people in the area.

Two students went to Rewari (Manjhwalia) and Patna in Bihar. Their objective was to explore and observe the different faces of liquor ban in Bihar which was imposed by the State Government in 2016 November.

Development Studies Practicum

Art and Craft session Digital Night school Khirkiri, Students working at Village, Gratitude Farms, Poothurai Chattisgarh (Photo from the report Tamil Nadu [Photo from the report of Taj Uddin Malik and Anupreet) Abba Rohit and N. S. Kisan]
Meeting with Villagers, Sarpanch, Ward Member and Farewell Visit with Students and Roshan Ram at Anganwadi teacher at Anganwadi Centre, Kharranagar [Photo from the field report of Mridu and Sourav]

Creating our own jobs, earning our own living; Netarhat, etc. in Jharkhand [Photo from the field report of Srividya the field Ramanathan]

Posters on Dahej Hatya and Beti Bachao anganwari in Beri, Jhajjar [Photo from report of Manisha]

Beginning of Gram Sabha at Shiradhoki Village, Yavatmal (Photo from the field report of Rajat and Nikita)

4. A BRIEF REPORT ON COLLABORATION (MoU) BETWEEN INDIAN INSTITUTION OF TECHNOLOGY MANDI AND INSTITUTIONS OVERSEAS

International Bachelor's, Master's and Ph.D. students can spend up to a year at IIT Mandi under student exchange. Also, international students can pursue graduate degree programs at the Institute. Students coming for student exchange or degree programs can get credit for courses they take at IIT Mandi. International students can work with the Institute's faculty on collaborative research topics involving institutional, regional, and national interests. IIT Mandi also provides possibilities for faculty members at international universities/institutes to spend time for the purposes of teaching and research. The fields in which IIT Mandi is currently involved at the Bachelor's, Master's, and Ph.D. levels include: Computer Engineering, Electrical Engineering, Civil Engineering, Mechanical Engineering, Basic Sciences, and Humanities and Social Sciences. The exchange visits are being performed as per the terms and conditions of the MoU/agreements.

Under an existing MoU with Worcester Polytechnic Institute (WPI), USA, IIT Mandi invited a team of 25 undergraduate students and two faculty mentors from WPI to visit the Institute for two-months between mid-March, 2019 and early-May, 2019. These students worked with similar number of IIT Mandi undergraduate students in solving a number of socioeconomic issues concerning the local communities in Mandi and Kamand. Furthermore, a number of international students visited IIT Mandi between 1st April, 2019, and 31st March, 2020. These included 5 students from Germany, 1 student from France, 1 student from Bhutan, one student from Bangladesh and 3 students from Ethiopia. Six students joined in August/September 2019 and one student joined in February 2020 from Nepal and Bangladesh for Masters and Ph. D program. Six students are from Nepal and one student is from Bangladesh.

There were a number of workshops conducted at IIT Mandi involving visitors from universities abroad between April, 2019 and March, 2020. The details of these workshops is given below.

ISTP Open House

The Interactive Socio-Technical Practicum (ISTP) course of IIT Mandi culminated in an Open House in April 2019 with a display of posters, prototypes and models. IIT Mandi students and 25 students from WPI (Worcester Polytechnic Institute, Massachusetts, USA) participated under the mentorship of IIT Mandi faculty mentors, and 2 WPI faculty mentors.

International Workshop on Climate Change and Extreme Events in the Himalayan Region

Indian Institute of Technology Mandi hosted an International Workshop on Climate Change and Extreme Events (C2E2) in the Indian Himalayan region from 18th to 20th April 2019, many Indian and international scientists attended to discuss climate change and extreme events.

Noted US geophysicist Prof Roger Bilham, University of Colorado Boulder, U.S., delivered a video lecture on 'Future great earthquakes in the Himalaya.' Prof. Roger Bilham is a wellknown U.S. geophysicist and his years of research forms the basis for the current knowledge about earthquakes in the Himalayan region.

International Conference on Differential Equations and Control Problems: Modeling, Analysis and Computations (ICDECP19)

IIT Mandi hosted this conference w.e.f. 17th to 19th June, 2019 and total 240 persons participated in this conference. 16 keynotes lectures were delivered by eminent mathematicians from IITs, TIFR, and universities and abroad. More than 60 invited lectures were delivered and about 130

contributed papers were presented by the young faculties and research scholars in the conference.

Hydrus workshop was organised at IIT Mandi from September 9th to 11th , 2019

The workshop on Hydrus software package with HP! and phreeqc module was organized from 9th to 11th Sept 2019. Prof. Jirka Simunek who has developed the code delivered a lecture. The workshop was organized jointly by IIT Mandi and IIT Jammu,

Dr. Deepak and Dr. Joshi were the coordinators from IIT Mandi and IIT Jammu respectively. Total 38 participants took part in the workshop from different parts of India, Sri Lanka and Nepal.

Prof. Sumant Nigam, Distinguished Professor, Department of Atmospheric and Oceanic Science, University of Maryland, USA, opted to take up a fellowship funded by the Fulbright programme and base himself at IIT Mandi. Further, he attended the foundation day event held on 24th Feb, 2020, as Chief Guest.

IIT Mandi students visiting Institutions abroad

A number of IIT Mandi graduate and undergraduate students visited several EU institutions under academic exchange in the year 2019. The undergraduate visits included: 4-students to TU Munich, Germany, 4-students to RWTH Aachen Germany, 3-students to Aalto University, Finland and 2- students to University of Stuttgart, Germany. 3-students of M. Tech visited Germany under DAAD (KOSPIE) program.

IIT Mandi Faculty visiting Institutions abroad

Several IIT Mandi faculty members visited institutions in Singapore, Sweden, France, Germany, UK, Poland, China, Italy, Japan, Taiwan, USA, Russia, Spain, Ireland, Switzerland, Greece, UAE, Jerusalem, Sweden, Shenzhen, Mozambican, Belgium, Prague, Netherlands, Egypt, Thailand, and Tanzania in 2019-20 for attending conferences and furthering industry and academic collaborations. The visits included seven faculty members from the School of Humanities and Social Sciences; twenty three faculty members from the School of Computing and Electrical Engineering; sixteen faculty members from the School of Basic Sciences; and, twenty faculty members from the School of Engineering.

Additionally, Director, IIT Mandi headed a faculty delegation to visit Kenya in May 2019 and Ethiopia in October 2019 for attracting students to pursue higher education.

MOU

Indian Institute of Technology Mandi has signed Memorandum of Understanding with the Norwegian University of Science and Technology (NTNU) Limited in February 2020. Based on MHRD directions, IIT Mandi signed an MoU with University of Stuttgart for executing the joint proposal between IITs and TU9 and the Memorandum of Understanding with the TU9 is signed in January 2020.

MOUs Renewed

Indian Institute of Technology Mandi has renewed its Memorandum of Understanding with RWTH Aachen, Germany in June 2019 and with Technical University of Munich, Germany in February 2020.

Hydrus workshop was organised at IIT Mandi from September 9th to 11th 2019

ISTP PROJECT 2019

With a Decade of Accomplishments, IIT Man di celebrates 11th Foundation Day

Climate Change and Extreme Events (C2E2) in the Indian Himalayan region from 18th to 20th April 2019

5. Thrust Area Research Centres

5.1 Advanced Material Research Centre (AMRC)

AMRC was established on 2013. Over the years AMRC is well known for its cutting-edge research, ancillary instruments, and well-organized administration. We support and foster the research enterprise, at the Indian Institute of Technology Mandi by providing facilities of analytical services to other academic institutes in India and external commercial organizations too. We are providing our instrumental facilities to 40 institutes in across the country.

Achievements Using AMRC Facilities

The research results, obtained using the facilities available at AMRC, have been published in reputed international journals. AMRC has produced more than 850 research articles since its inception, and in the year 2019-20 more than 270 research articles have been published.

Students' Achievements:

- Ms. Bidisha Biswas: Received best oral presentation in SMST February 2020.
- Mr. Navneet C Verma:Received best poster award from chemical research society of India (CRSI) in 25th CRSI National Symposium in Chemistry CRSI NSC 25" IIT Kanpur. India July 19 -21 2019.
- Mr. Aditya Yadav: Received best poster award from chemical research society of India (CRSI) in 25th CRSI National Symposium in Chemistry CRSI NSC 25" IIT Kanpur. India July 19-21 2019.
- Mr. Aamir: Received best poster awards in CAMNP 2019 held at DTU, Delhi.
- Mr. Aamir: Received best poster awards in SMST 2020 held at IIT Guwahati.
- Mr. Ashish Bhatia: Received Best poster award in international conference on nano materials for energy, environment and sustainability at ITER SOA Bhubaneswar Dec 2019
- Ms. Tripti Chabra: Received Best poster award in international conference on advanced materials 12th June 2019 organised by Dept. of Physics, Nirmalgiri College, Kannur, Kerala.
- Mr. Piyush Avasthi: Received Best poster presentation award in "International conference on Electron Microscope & Allied Analytical Techniques 2019 (EMAAT)" organized by Electron Microscopy Society of India (EMSI) held at Shimla, Himachal Pradesh in June 2019.
- Ms. Nitika Arya: Received "Materials Chemistry Frontiers Poster Prize (Best Poster)" at the International Workshop on Advances in 2D Materials (IW2DM) held at Indian Institute of Science Education and Research (IISER), Thiruvananthapuram, India on 22- 23 July, 2019.
- Ms. Nitika Arya: Received Best Poster prize in 12th Asia-Pacific Microscopy Conference (APMC) organized by Electron Microscopy Society of India (EMSI) held at HICC, Hyderabad,India 3rd -7th February, 2020.
- Ms. Kavita Yadav: Received Best poster award: Research fair, IIT Mandi 2019.
- Mr. Aditya Yadav: Received Best poster award: Research fair, IIT Mandi 2019.
- Ms. Poonam Jyoti: Received Best Poster award in the Annual meeting of Biological Engineering Society and Conference, IIT Madras, Oct 18th -20th, 2019.

Publications in Selected Journals

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- Diksha Thakur, Deepak Kumar Dubey, Rohit Ashok Kumar Yadav, Mangili Venkateswarulu,Subrata Banik, Jwo-Huei Jou and Subrata Ghosh. J. Mater. Chem. C, 2020, 8, 228-239. Solution-processed hybrid hosts: a way to explore high triplet energy with admirable current and power efficiency without outcoupling techniques for phosphorescent OLEDs.
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- S. Kumar, A. Kumar, V. N. Rao, A. Kumar, M. V. Shankar and V. Krishnan. Evolution-ACS Appl. Energy Mater. 2019, 2, 5622-5634. Defect-Rich MoS2 Ultrathin Nanosheets-Coated Nitrogen-Doped ZnO Nanorod Heterostructures: An Insight into in-Situ-Generated ZnS for Enhanced Photocatalytic Hydrogen.
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- Chethana Rao, Navneet C. Verma and Chayan K. Nandi. J. Phys. Chem.C. 123, 2673-2677, (2019) Unveiling the Hydrogen Bonding Network of Intracellular Water by Fluorescence Lifetime Imaging Microscopy".
- P Avasthi, V Balakrishnan, Advanced Materials Interfaces 6(6),1801842 (2019). Tuning the Wettability of Vertically Aligned CNT–TiO2 Hybrid Electrodes for Enhanced Super capacitor Performance, Advanced Materials Interfaces 6 (6), 1801842 (2019).
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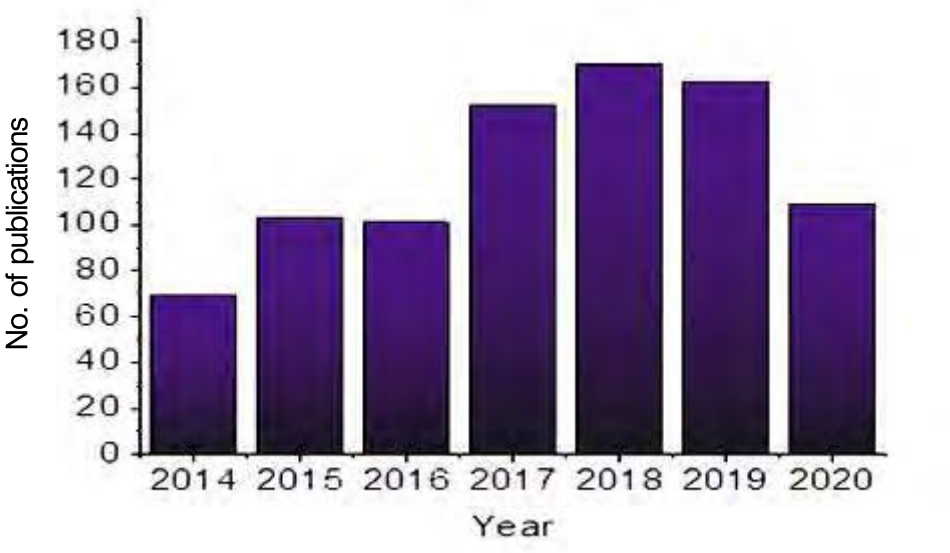


Year wise publication from 2014 to 2020

Instruments Facility at AMRC

Nuclear Magnetic Resonance NMR

High Resolution Transmission Electron Microscope with Electron Spray deposition

Confocal Microscope

High Resolution Mass Spectrometer

Field Emission Scanning Electron Microscopy

Pump Probe

X-Ray Photo Electron Spectroscopy

Magnetic property measurement system

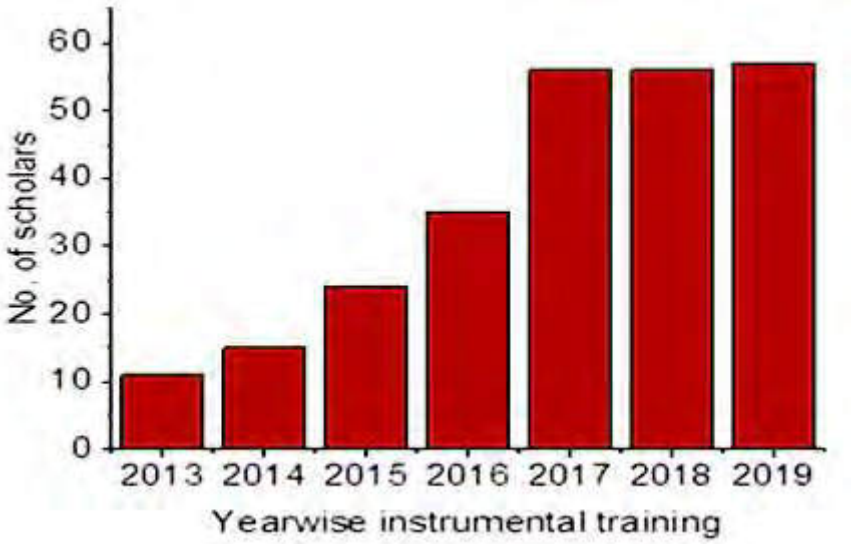
Physical property measurement measurement system

Liquid N2 Plant

Raman Spectrometer

Training on Instruments

In order to provide intensive instrumental knowledge to the scholar, instrumentation training is being organized periodically. Please see below year-wise statistics.



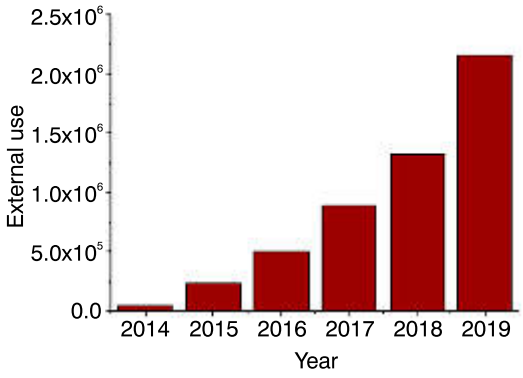
Safety training at AMRC

Safety is the first priority at AMRC. AMRC organizes safety test followed by safety training in every semester. In order to ensure the safety of the centre, the proper protocols have been followed while segregating and disposing the waste chemicals.

The figures represent the safety training for AMRC Scholars

Instrumental facility for external users

AMRC is providing instrumental facility to the other institutes throughout India on payment basis which is very fast and efficient.



List of external Institutions throughout India where AMRC is providing instrumental facility

- NIT Hamirpur, HP
- CSIR-IHBT Palampur, HP
- HPU Shimla, HP
- Shoolini university, HP
- Sri Sai University, Palampur HP
- Jaypee University, HP
- Carrier Point University, HP
- Arni University.Kangra, HP
- Maharaja Agra Sen University, Baddi, HP.
- Laureate Institute of Pharmacy, Kathog, Kangra, .
- M Pharmacy Institute, Jwalamukhi. HP.
- Indus International University, Bathu, Una, HP.
- A.P. Goyal Shimla University, Shimla, HP.
- Baddi University, Baddi, HP.
- Eternal University, Baru Sahib, Kangra, HP.
- School of Pharmacy and Emerging Science University, Baddi, HP.
- Jammu University.
- YS Parmar University, Solan, HP.
- Govt College Jammu.
- NIT Jammu.
- NIT Srinagar.
- Sri Mata vaishno Devi University Jammu
- NIT Jalandhar, Punjab.
- NIT Manipur
- NIT Delhi, New Delhi.
- NIT Durgapur, West Bengal.
- IIT Gandhinagar
- IIT Ropar, Punjab
- IIT Guwahati, Assam
- IIT Patna, Bihar.
- IISC Bangalore
- Doon University, UK
- Jamia Millia Islamia University, New Delhi.
- Kuruhshetra University, Kurukshetra.
- Agra University, Agra.
- Punjab University, Patiala
- Shiv Nadar University, New Delhi
- HNBG University, UK
- Madhav University, Rajasthan
- IIT Patna, Bihar.
- NIT Trichy, TamilNadu.
- Indian Institute of Petroleum. Dehradun.
- B.B. Ambedkar University. Lucknow.
- Guru Nanak Dev University, Amritsar.
- INST Mohali, Chandigarh, Punjab.

Outreach activity at AMRC

AMRC has been organizing outreach program for the school and college students throughout Himachal Pradesh. In this program the students acquire basic knowledge about the instruments and various techniques which can motivate them towards science and technology in near future. Nearly 1300 students through-out Himachal Pradesh visited AMRC in the year 2019 and 2020. The list is given below:

S.No.	Name of School/Program/Institute	Number of students	Visiting date
1	GSSS Salot	68	12.04.2019
2	RK International Sarkaghat	98	29.04.2019
3	Sri Sai University	41	06.05.2019
4	Cooch Behar Panchanan Barma University	16	18.05.2019
5	JNGEC Sundernagar Mandi	62	22.08.2019
6	Vallabh Government College Mandi	70	06.11.2019
7	GSSS Harnora Bilaspur	35	28.11.2019
8	GSSS Sidhyani	20	02.12.2019
9	DAV Sundernagar	100	09.12.2019
10	Maurya Public School Sundernagar	50	10.12.2019
11	Lord Budha Public School	16	20.12.2019
12	GSS Kapahi	50	10.01.2019
13	GSSS Ghashnoo	58	16.01.2020
14	GSSS Drang	51	23.01.2019
15	GSSS Baldwara	38	24.01.2020
16	GSSS Sianj	83	27.01.2020
17	GSSS Padhar	76	29.01.2020
18	GGSSS Bhangrotu	45	30.01.2020
19	GSSS Urla	63	31.01.2020
17	GSSS Gokhda	35	06.02.2020
18	GSSS Randhada	33	06.02.2020
19	GBSSS Bhangrotu	88	13.02.2020
20	DIET Kullu (Schools of Kullu District)	72	20.02.2020
21	GSSS Kot Tungal	18	27.02.2020
	Total no of school students	**1286**	

- **For more information on AMRC contact:**

Coordinator: Dr. Rik Rani Koner, Ph.: 01905-267220
AMRC Office, IIT Mandi, South Campus, Kamand, H.P. (175005), Ph : 01905-267027
Email: amrcoffice@iitmandi.ac.in
Website: www.iitmandi.ac.in/research/amrc/index.php

5.2 CENTRE FOR DESIGN & FABRICATION OF ELECTRONIC DEVICES, (C4DFED)

Co-ordinator: Dr. Satinder Kumar Sharma
https://c4dfed.iitmandi.ac.in

"Project Review & Steering Committee (PRSC)"

Dr. Satinder Kumar Sharma (SCEE, IIT Mandi)	Coordinator
Prof. Timothy A. Gonsalves (SCEE, Emeritus Prof.)	Founder Director/ Member
Prof. Kenneth Gonsalves (SBS, IIT Mandi)	Distinguish Prof./ Member
Dr. Subrata Ghosh (SBS, IIT Mandi)	Member
Dr. Hitesh Shrimali (SCEE, IIT Mandi)	Member
Dr. Viswanath Balakrishnan (SE, IIT Mandi)	Member
Dr. Ajay Soni (SBS, IIT Mandi)	Member
Dr. Ankush Bag (SCEE, IIT Mandi)	Member
Dr. Amit Jaiswal (SBS, IIT Mandi)	Member
Dr. Abhishek Rai (C4DFED, IIT Mandi)	Member Secretary

"Core Research Committee (CRC)"

S. No.	Name	School	E-mail id:
1	Dr. Ajay Soni	SBS, IIT Mandi	ajay@iitmandi.ac.in
2	Dr. Amit Jaiswal	SBS, IIT Mandi	j.amit@iitmandi.ac.in
3	Dr. Ankush Bag	SCEE, IIT Mandi	ankushbag@iitmandi.ac.in
4	Dr. C. S. Yadav	SBS, IIT Mandi	shekhar@iitmandi.ac.in
5	Dr. Gaurav Bhutani	SE, IIT Mandi	gaurav@iitmandi.ac.in
6	Dr. G. Shrikanth Reddy	SCEE, IIT Mandi	gopishrikanth@iitmandi.ac.in
7	Dr. Hitesh Shrimali	SCEE, IIT Mandi	hitesh@iitmandi.ac.in
8	Dr. Kunal Ghosh	SCEE, IIT Mandi	kunal@iitmandi.ac.in
9	Dr. Pradeep Kumar	SBS, IIT Mandi	pkumar@iitmandi.ac.in
10	Dr. Pradeep Parameswaran	SBS, IIT Mandi	pradeep@iitmandi.ac.in
11	Dr. Rahul Shrestha	SCEE, IIT Mandi	rahul_shrestha@iitmandi.ac.in
12	Dr. Satinder K. Sharma	SCEE, IIT Mandi	satinder@iitmandi.ac.in
13	Dr. Satvasheel Ramesh Powar	SE, IIT Mandi	satvasheel@iitmandi.ac.in
14	Dr.Shubhajit R. Chowdhury	SCEE, IIT Mandi	src@iitmandi.ac.in
15	Dr. Srikant Srinivasan	SCEE, IIT Mandi	srikant@iitmandi.ac.in
16	Dr.SrinivasuBodapati	SCEE, IIT Mandi	srinivasu@iitmandi.ac.in
17	Dr. Subrata Ghosh	SBS, IIT Mandi	subrata@iitmandi.ac.in
18	Dr. Swati Sharma	SE, IIT Mandi	swati@iitmandi.ac.in
19	Dr. Venkata Krishnan	SBS, IIT Mandi	vkn@iitmandi.ac.in
20	Dr. Viswanath Balakrishnan	SE, IIT Mandi	viswa@iitmandi.ac.in

Executive Summary

This documents serves as the Centre for Design & Fabrication of Electronic Devices (C4DFED)'s official annual report for FY 19-20. C4DFED facility at IIT Mandi is a unique facility for multidisciplinary research on device design and fabrication at IIT Mandi where many state of the art facilities and utilities are housed inside class 100, class 1000 and class 10000 clean laboratories.This high end state of the art facility was inaugurated by Shri R. Subrahmanyam, Secretary (HE), Ministry of Human Resource Development (MHRD), Government of India on 31st October, 2018.

The ultimate goal of this Centre is to cater the different need of IIT Mandi research and scientific community for various ongoing projects and futuristic and also train the students to provide skilled professionals and researchers to serve India and semiconductor industries/society in the long run. The C4DFED facility at IIT Mandi is fully operational from last two years and is now capable of handling research projects like Development and Application of Nanoelectronics, Development of Extreme Ultraviolet Lithography (EUL) resists materials for the next generation technology node, IC design and fabrication and Nano-Micro (NEMS & MEMS) systems and designs etc. A good number of researchers, students from the institute and neighboring institutes are benefited

from this infrastructure available at IIT Mandi and this is also a source of revenue generation for the self-sustainability of facility. The user charges collected in two past quarter are around 4 Lakhs. Along with that, many government institute like ISRO, DRDO, DST etc. or industrial funded projects have been successfully completed or still going on. In the present projects, center manager, two project staff and instrument operators are hired for the proper day to day operations of center facilities. Whereas, two technical staff members are taking care of the complete clean room & plant room operations, which are equipped with AHUs, MAUs, Chillers, UPS and BMS.

To make C4DFED facilities self-reliance and self-sustainable, a cumulative effort has been started. In this regard, an expert committee from different institutes/organizations from India (IIT Mandi, IIT Delhi, IISc, IIT Ropar, ISRO, DRDO and company etc) and abroad have visited in person/skype IIT Mandi C4DFED facility, on 11th Dec 2019 and as per their suggestions center is going to organizing more training programs, workshops and conference like previous year.

Highlights of C4DFED

Users	• All IIT Mandi faculties who have similar research interest. • Masters and PhD students of IIT Mandi & other institutes . • Academic, Research & Industrial institutes.
Total Cost of the project	Rs.10 Crores + Rs.40 Crores Equipment
Electrical Power required	600 KVA
Class 100 area	1200 Sq Ft
Class 1000 area	450Sq Ft
Class 10000 area	350 Sq Ft
Class 100000 area	2000 Sq Ft

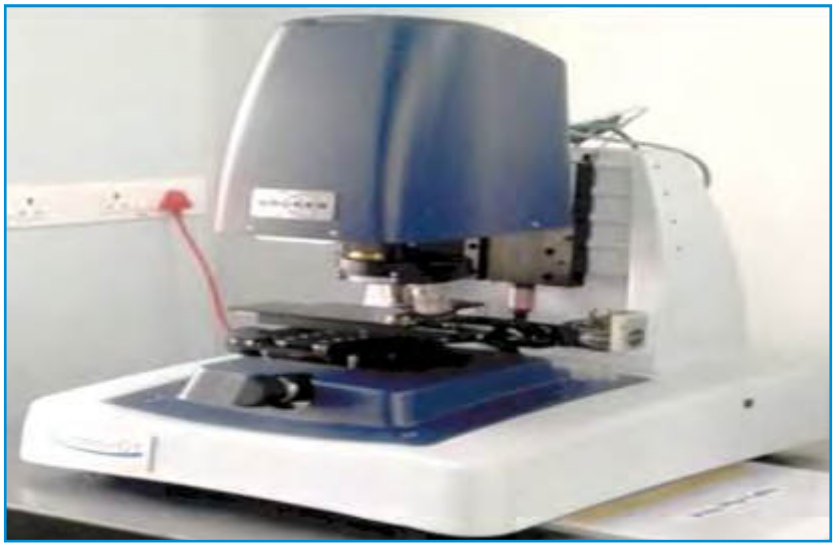
List of Facilities/Equipment's at C4DFED

AFM (Atomic Force Microscopy)

Company: Bruker

Model: Dimension ICON PT

Purpose: Atomic force microscopy (AFM) is very-high-resolution type of scanning probe microscopy, with demonstrated resolution on the order of fractions of a nanometer. The purpose of this instrument is to analyse the surface properties of thin films.



Optical Profilometer

Company: Bruker

Model: CONTOURGT-K Automated System

Purpose: The purpose of profilometry is to get surface morphology, step heights and surface roughness. It is a non-contact technique.

Stylus Profilometer

Company: AEP Technology

Model: Nano Map-LS

Purpose: The purpose of profilometry is to get surface morphology, step heights and surface roughness. Stylus profilometry requires force feedback and physically touching the surface, so while it is extremely sensitive and provides high Z resolution.

Ellipsometry

Company: Accurion

Model: EP4

Purpose: This instrument can be used for extraction of the dielectric properties as well thickness of the thin film typically of few nm. The instrument relies on the fact that the reflection at a dielectric interface depends on the polarization of the light while the transmission of light through a transparent layer changes the phase of the incoming wave depending on the refractive index of the material.

FESEM: (Field Emission Scanning Electron Microscope)

Company: Carl Zeiss Microscope

Model: GeminiSEM 500

Purpose: Field emission scanning electron microscopy (FESEM) provides topographical and elemental information at magnifications of 10x to 300,000x, with virtually unlimited depth of field. Applications of FESEM include:

- Semiconductor device cross section analyses for gate widths, gate oxides, film thicknesses, and construction details
- Advanced coating thickness and structure uniformity determination

The additional attachments with the FESEM allow the electrical characterization of transistor at nano-meter level.

Helium Ion Beam Lithography

Company: Carl Zeiss Microscope

Model: ORION Nano Fab

Purpose: An emerging litho-graphic technique offers a promising alternative to electron beam lithography for fabricating new semiconductor devices with both traditional and non-traditional resists. This allows pattering for the transistor fabrication below 10 nm.

Maskless Lithography

Company: Intelligent Micro Patterning

Model: SF - 100 Xpress Maskless Exposure

Purpose: This instrument is used for pattering for device fabrication using CAD based Mask. This instrument has the resolution of 5 μm.

Electron Beam Lithography

Company: Raith

Model: eLine Plus

Purpose: Electron-beam lithography (often abbreviated as e-beam lithography) is the practice of scanning a focused beam of electrons to draw custom shapes on a surface covered with an electron-sensitive film called a resist. This instrument pattern the substrate that are not possible with the conventional photolithography.

Mask Aligner

Company: EV group

Model: EVG610

Purpose: Mask Aligner is the mask dependent lithography system depending on the flood exposure of UV light.

Glove Box

Company: SciLab - Vigro Gas Purification tech.

Model: SGI 200/750TS

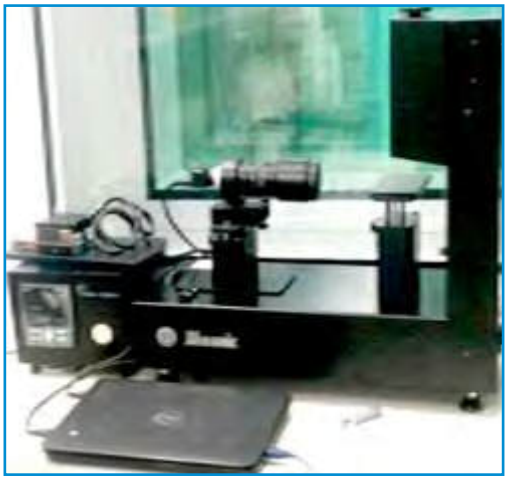
Purpose: This system is used for the synthesis of the device in the controlled atmosphere of the desired Gas.

Optical Microscope

Company: Olympus

Model: BX-51 TRF

Purpose: This is high end optical microscope with the attached accessories for temperature dependent analysis. This microscope has a resolution of 100x.



Contact Angle

Company: SEO (Surface electro Optics) Phoenix 300

Model: SEO Phoenix 300

Purpose: The purpose is to verify whether the substrate is hydrophobic or hydrophilic in nature.

Electrochemical Analyser

Company: CH instrument

Model: (CHI604E)

Purpose: It is for the measurement of potential, charge, or current to determine an analyte's concentration or to characterize an analyte's chemical

Spin Coater

Company: Laurell International

Model: WS-650MZ-23NPP

Purpose: It is used for the thin film deposition when the material is in liquid form. Usually a small amount of coating material is applied on the center of the substrate, and then rotated at the desired speed.

Sputtering System

Company: Advanced Process Technology

Model: Self Assembled

Purpose: It is used for the solid-state thin film deposition for device fabrication. Two different types of sputtering are available one is RF sputtering and DC sputtering.

Reactive Ion Etching

Company: PLANAR tech.

Model: PlanarRIE-6s

Purpose: It is used for dry etching using reactive gas discharge.

Thermal Evaporator

Company: Hind High Vacuum.

Model: BC -300

Purpose: This is used for physical Vapour deposition of the material. It is basically based on the principle of heating the material upto its melting point in high vacuum atmosphere.

Electrical Characterization System

Company: Tektronics (Keithley)

Model: Keithley 4200 SCS

Purpose: It is used for electrical characterization of the devices (including two terminal, three terminal and four terminal devices).

Electrospinning

Company: E-Spin nanotech

Model: Super- ES2

Purpose: Electrospinning is a fiber production method which uses electric force to draw charged threads of polymer solutions or polymer melts up to fiber diameters. These fibers further can be used for singe fibre-based devices.

3 Zone furnace

Company: Thermo scientific

Model: Lindberg Blue M

Purpose: This is used for the oxidation and annealing of the devices in the controlled environment upto 1100˚C. This system is modified to perform Chemical Vapor deposition well.

3D Printer

Company: General Laboratory equipment

Model: XYZ Printing PRO

Purpose: 3D printing joins or solidifies polymer under computer control to create a three-dimensional object. These can be used further used for sensor (biological, chemical and physical) applications.

Number of Students/Researchers Benefited from C4DFED facility at IIT Mandi so far

i) Academic year (2018-2019): 45
ii) Academic year (2019-2020): 75

List of Publication and Patents from C4DFED

A total of 22 publications and 2 patents have been generated from the C4DFED facility since inception. The list is as follows:

Publications in Journals

- Focusing on nanoparticles based photomultiplier in n-CARs, Satinder K. Sharma, Mohamad G.Moinuddin, Midathala Yogesh, Shivani Sharma, Manoj Sahani, Subrata Ghosh, and Kenneth E.Gonsalves; Proceedings Volume 11326, Advances in Pattern-ing Materials and Processes XXXVII; 113261C, (2020); 10.1 117/ 12.25 521 90.
- All new nickel based Metal Core Organic Cluster (MCOC) resist for N7+node patterning Satinder K. Sharma, Rudra Kumar, Manvendra Chauhan, Mohamad G. Moinuddin, Jerome Peter, SubrataGhosh, Chullikkattil P. Pradeep, and Kenneth E. Gonsalves; Proceedings Volume 11326, Advances in Patterning Materials and Processes XXXVII; 1132604, (2020); 10.1 117/ 12.2552189.
- Highly sensitive electrochemical sensing of neurotransmitter dopamine from scalable UV irradiation-based nitrogen-doped reduced graphene oxide-modified electrode, Richa Soni, Kumar Palit, Mahesh Soni, Rudra Kumar and Satinder K. Sharma; Bulletin of Materials Science, (2020); 10.1007/s12034-020-02091-w.
- Mechanistic Insights of Sn-Based Non-Chemically-Amplified Resists under EUV Irradiation,Guilherme K. Belmonte, Suelen W. Cendron, Pulikanti Guruprasad Reddy, Cleverson A.S. Moura,Mohamad Ghulam Moinuddin, Jerome Peter, Satinder K. Sharma, Gabriela Lando, Marcelo Puiatti, Kenneth E. Gonsalves, Daniel E.Weibel; Applied Surface Science, (2020) ;10.1016 /j.a psusc.2020.146553.
- Development of Nickel-Based Negative Tone Metal Oxide Cluster Resists for Sub-10 nm ElectronBeam and Helium Ion Beam Lithography, Rudra Kumar, Manvendra Chauhan, Mohamad G.Moinuddin, Satinder K. Sharma, and Kenneth E. Gonsalves; ACS Applied Materials & Interfaces, (2020); 10.1021/ acsami. 9b21414.
- Organotin in Nonchemically Amplified Polymeric Hybrid Resist Imparts Better Resolution with Sensitivity for Next-Generation Lithography, Jerome Peter, Mohamad G. Moinuddin, Subrata Ghosh, Satinder K. Sharma, and Kenneth E. Gonsalves; ACS Applied Polymer Materials, (2020); 10.1021/acsapm.0c 00005.
- Low-Current-Density Magnetic Tunnel Junctions for STT-RAM Application Using MgOxN1x (x = 0.57) Tunnel Barrier, M. G. Moinuddin, Aijaz. H. Lone, Shivangi Shringi, Srikant Srinivasan and Satinder K Sharma, IEEE Transactions on Electron Devices, (2019); 10.1109/ TED.2019. 295 4131.
- Alternate lanthanum oxide/silicon oxynit-ride-based gate stack per-formance enhancement due toult-rathin oxynitride interfacial layer for CMOS applications, Prachi Gupta, Mahesh Soni, Satinder K.Sharma; Journal of Materials Science: Materials in Electronics,vol 31, pp-1986-1995,Dec(2019);10.1007/s10854-019-02718-7.
- Impact of annealing temperature on band-alignment of PLD grown Ga2O3/Si (100) heterointerface, Manoj K. Yadav, Arnab Mondal, Subhashis Das, Satinder K. Sharma, Ankush Bag, Journal of Alloys and Compounds 815(2020)153052; 10.1 016/j.jallcom.2019.153052.
- Realization of large area Co20-Fe60B20 based p-magnetic tunnel junction for CMOS compatibledevice application, Mohamad G. Moinuddin, Aijaz Lone, Srikant Srinivasan, & Satinder K.Sharma, ACS Applied Electronic Materials, (2019); 10.1021/acsaelm. 9b 00 469.

- Realization & Performance Analysis of Facile Processed ï¿½-IDE based multi-layer HfS2/HfO2Transistors Shivani Sharma, Subhashis Das, Robin Khosla, Hitesh Shrimali, Satinder K. Sharma; IEEE Tran-saction on Electron Devices, Volume: 66, Issue: 7, July(2019); 10.1109/TED.2019.2917323.
- Facile Synthesis of 2D-HfS2 Flakes/?-IDE based Highly Sensitive and Selective Sensor for Methanol Sensing Application at Room Temperature, Subhashis Das, Shivani Sharma and Satinder K. Sharma; IEEE Sensors Journal, 26 June (2019); 10.1109 / JSEN.2019. 2925027.
- Low Voltage & Controlled Switching of MoS2-GO Resistive Layers based ReRAM for Non-Volatile Memory Applications, Sumit Choudhary, Mahesh Soni, and Satinder K. Sharma; Semicond.Sci. Technol.34, 085009, 11pp, (2019); 10.1088/1361-6641/ab2c09.
- Highly UV sensitive Sn Nanoparticles blended with polyaniline onto Micro-Interdigitated Electrode Array for UV-C detection applications, Shivani Sharma, Subhashis Das, Robin Khosla, Hitesh Shrimali, and Satinder K. Sharma; Journal of Materials Science: Materials in Electronics; Vol. 30, Issue 8, pp 7534-7542, (2019);10.1007/s10854-019-01067-9.
- Evaluation of Diode Characteristics for Fully Vertical β-Ga2O3 on Silicon (100) Substrate, Manoj Kumar Yadav, Satinder K. Sharma, and Ankush Bag, Journal of Materials Science: Materials in Electronics (accepted).
- Transition from Thin Film to Nano-structure in Low Pressure Chemical Vapor Deposition Growth of β-Ga2O3: Impact of Metal Gallium Source, Arnab Mondal, Manoj Kumar Yadav, and Ankush Bag; Thin Solid Films (accepted); doi.org/10.1016 / j.tsf.2020.138234.
- Performance Enhancement of-Ga2O3 on Si (100) based Schottky Barrier Diodes using RESURF,Manoj Kumar Yadav, Arnab Mondal, Shivangi Shringi, Satinder K. Sharma, and Ankush Bag; Semi-conductor Science and Technology, 35 (2020) 085009.
- Ultra-High Responsivity (>12.34 kA/W) of Ga-In Bimetallic Oxide Nanowires Based deep-UV Photo-detector, Ashish Kumar, and Ankush Bag, Nanotechnology, 31(2020) 304001.
- Extremely Low Dark Current and Detection Range Extension of Ga2O3 UV Photodetector using Sn Alloyed Nano-structures, Arnab Mondal, Manoj Kumar Yadav, Shivangi Shringi, and Ankush Bag, Nano-technology, 31(2020) 294002.
- High Responsivity of Quasi-2D Electrospun β-Ga2O3 based Deep-UV Photodetectors, Ashish Kumar, and Ankush Bag,IEEE Photonics Tech-nology Letters,31 (2019) 619-622.

Publications in Conferences

- Focusing on nanoparticles based photomultiplier in n-CARs,Satinder K. Sharma, Mohamad G. Moinuddin, Midathala Yogesh, Shivani Sharma, Manoj Sahani, Subrata Ghosh, Kenneth E. Gonsalves; Proc. SPIE 11326, Advances in Patterning Materials and Processes XXXVII, 113261C, San Jose,California, USA, 23 March 2020. 10.1117/12.2552190.
- All new nickel based Metal Core Organic Cluster (MCOC) resist for N7+ node patterning Satinder K. Sharma, Rudra Kumar, Manvendra Chauhan, Mohamad G. Moinuddin, Jerome Peter,Subrata Ghosh, Chullikkattil P. Pradeep, Kenneth E. Gonsalves; Proc. SPIE 11326, Advances inPatterning Materials and Processes XXXVII, 1132604, San Jose, California, USA, 26 March 2020. 10.1117/12.2552189.

Patents

- Metal-organic Clusters (MOCs) Resist for Sub 10 nm Semiconductor Technology Node Patterning by Helium Ion Beam (He + BL), and Electron Beam Lithography (EBL).

  Inventors: Rudra Kumar, Manvendra Chauhan, M. G. Moinuddin, Satinder K. Sharma, Kenneth E. Gonsalves; (Application number: 202011003482).
- Reconfigurable Reduced Switching Activity (Rsw) Mode for an Analog-To-Digital Converter.

  Inventors: Ashish Shirish Joshi, Hitesh Shrimali, Satinder Kumar Sharma (Application number: 201911042977).

Ongoing Projects and Funding at the Centre

- Development of Indigenous photoresists technology for semiconductor industries: impact on Indian economy, skilled manpower development and employment possibility~ Rs 239 Lakhs, form MHRD, India (September 2016 – July 2020).
- Design and fabrication of an interface ASIC for a vibratory gyroscope sensor application~ Rs 45.76 Lakhs, Funding Agency-ISRO, India (November 2018-November 2020).
- Low- Temperature epitaxial growth of high mobility Ge1-xSnx channel material for Pt/TiN/ high-k/GeOXNY/Ge1-XSnX/Ge/Si transistor to the integration of next generation CMOS and Optoelectronics device on cost effective Si Platform~6.57 Lakhs, Funding Agency-DST, India (March 2019-March 2021).
- C4DFED (Clean Room) Facility Project (IITM/INT/SKS/01) funded by IIT Mandi.

National and International Distinguished Visitor at the Center

- Dr. Mahadeva Bhat K, Sc 'F', SMRC GAETEC, visited the Centre on 25/06/2019.
- Dr. Saifullah Lone, NIT Srinagar, visited the Centre on 25/06/2019.
- Dr. Manoj K. Singh, visited the Centre on 25/06/2019.
- Dr. Nikita Jain, DTU Delhi, visited the Centre on 25/06/2019.

- Himanshu Dev, IISER Mohal, visited the Centre on 26/06/2019.
- Dr. Chandra S. Sharma, IIT Hyderabad, visited the Centre on 27/06/2019.
- Kapil Dev, University of Delhi, visited the Centre on 28/06/2019.
- Dr. Surender Kumar, Ghent University Incheon, South Korea, visited the Centre on 29/06/2019.
- Dr. Prabhat Khedgarkar, NIT Hamirpur, visited the Centre on 30/06/2019.
- Dr. V. Ganesan, UGC-DAE CSR, Indore, visited the Centre on 23/08/2019.
- Dr. B. S. Manjunath, Sc. 'E', BARC-Mysuru, visited the Centre on 24/09/2019.
- Prof. A. K. Chakraborti, NIPER Panjab, visited the Centre on 15/10/2019.
- Prof. K. N. Satyanarayana, Director, IIT Tirupati, visited the Centre on 27/11/2019.
- Dr. Tessy Thomas, DS & DG (AERO), DRDO visited the Centre on 05/12/2019.
- Prof. C. S. Kumar, Mechanical Engineering, IIT Kharagpur, visited the Centre on 09/12/2019.
- Dr. K. B. Batra, BHEL Haridwar, visited the Centre on 07/12/2019.
- Dr. Suresh S. J., CoNES, IISc Bengaluru, visited the Centre on 11/12/2019.
- Dr. Gireesh Sharma, IISU-\ISRO Thiruvananthapuram, visited the Centre on 13/12/2019.
- The Governor of Himachal Pradesh, Honourable Shri BandaruDattatreya, visited the Center on 15/12/2019.
- Professor Naoto Chatani, Osaka University-Japan, visited the Centre on 13/01/2020.
- Dr. Srikanth Sugavanam, Aston University UK, visited the Center on 13/01/2020.
- Prof. T. K. Bhattacharyya, ESECE Department, IIT Kharagpur, visited the Centre on 15/02/2020.
- Dr. Mahendra Sakare, IIT Ropar, visited the centre on 15/02/2020.

Appendix

Rate Structure for C4DFED Facility Users

C4DFED based facilities are available to internal and external users on nominal charges. Below is the rate structure of the C4DFED facility, which is also available online.

SNo.	Equipment	Make/Model	Academic Subsidized Charges for Internal Users (in Rs.)	Charges for External Academic users (in Rs.)	Charges for Industry users (in Rs.)
1	**FESEM**	**Zeiss**	750	1875	3750
2	**HE Ion Microscope**	**Orion, Zeiss**	2000	5000	10000
3	**AFM**	**Bruker**	500	1250	2500
4	**Raith EBL (exposure only)**	**Raith**	1000	2500	5000
5	**Ellipsometer (Data Acquisition)**	**Accurion**	500	1250	2500

6	**Ellipsometer (Modeling & Analysis)**	**Accurion**	2500	6250	12500
7	**Maskless Lithography (Exposure only)**	**Intelligent Micro Patterning**	200	500	1000
8	**Optical Lithography**	**EV Group**	250	625	1250
9	**Stylis Profiler**	**AEP Technology**	100	250	500
10	**Optical Profiler**	**Bruker**	150	375	750
11	**RIE**	**Planer Tech.**	300	750	1500
12	**E-Spin**	**E-Spin nanotech**	100	250	500
13	**Sputtering**	**Advance Process Technology**	400	1000	2000
14	**Optical Microscope**	**Olympus**	100	250	500
15	**Keithley Syatem with Probe Station**	**Keithley**	100	250	500
16	**Glove Box**	**SciLab SG1200/750TS**	150	375	750
17	**Thermal Evaporation**	**Hind High vacuum**	300 (per run)	750 (per run)	1500 (per run)
18	**Spin Coater (Controlled atmosphere)**	**Laurell**	75 (per sample)	200 (per sample)	600 (per sample)
19	**Spin Coating (In air)**	**Spectro Spin**	50 (per sample)	125 (per sample)	250 (per sample)
20	**Contact Angle**	**SEO Phoenix 300 Touch Contact Angle**	50 (per sample)	125 (per sample)	400 (per sample)
21	**3D printer**	**XYZ Printing Pro**	100	250	500
22	**Electro Chemical Analyzer**	**CH Instruments**	100	250	500
23	**Three Zone Furnace 1000 °C**	**Thermofisher scientific**	100	250	500
24	**Vacuum Oven**	**Nanosemi Technology**	100 per day	250 per day	500 per day
25	**DI Water**	**Millipore**	50 per liter	125 per liter	250 per liter
26	**Clean Lab Space (5'x5')**	**-**	2000 per day	5000 per day	10000 per day

5.3 BioX

Situated in the largely agrarian, scenic and fragile Central Himalayas, IIT Mandi has a focus on agriculture and the environment. Another important focus area of research is human health. Towards this, IIT Mandi has initiated activities in the life sciences in the broad areas of immediate relevance to the Himalayan region, and to health care particularly for the rural and lower-income strata of society. There is an immediate need to extend the benefits of advanced knowledge and technology to the traditional farmers, particularly those engaged in the cultivation of fruits, vegetables, saffron and medicinal plants in this region. Also, with the advancements in technology, better health care regimes need to be evolved.

Towards these goals, IIT Mandi has taken initiatives to conduct interdisciplinary research and developments including faculties from various different disciplines of basics sciences and engineering. As a part of this initiative the BioX Centre was conceived at IIT Mandi in 2012, driven by the need for affordable health care for India, and advanced technology interventions in agriculture and for preservation of the environment in the Himalayan Region. Since then, IIT Mandi has recruited six faculties and two fellows in Life Sciences as a part of the School of Basic Sciences. These faculties and fellows along with the faculties from the other Schools, including the School of Computing and Electrical Engineering and School of Engineering, are engaged in highly interdisciplinary research in the focus areas of life sciences, biophysics, nanotechnology, bioinformatics, plant systems biology, and others. In addition, IIT Mandi also made an initial investment of Rs. 10 crores for purchasing lab equipment related to these areas. A similar amount of funding has also been received by the individual faculties and researchers working in the Centre from different funding agencies including DBT, DST, SERB, MHRD, etc. As it had reached a critical mass, the formal structure of the BioX Centre was finally approved in December 2016.

The broad visi on of the BioX Centre at IIT Mandi is to perform cutting edge research in the focus areas of Systems and Synthetic Biology with applications in Health care, Agriculture, and Environment. The BioX Centre is envisioning to push the frontiers of technology development and engineering toward advancements in disease prevention and affordable health care, agricultural practices with respect to the Himalayan region, and Himalayan Biodiversity exploration for biotechnological applications by bridging the gap between life sciences, physical sciences, and engineering. Some of the important missions of the BioX Centre include:

- To tackle major health-related and agri-based challenges and perform cutting-edge research.
- To encourage multi-institutional and inter-disciplinary collaborations to attract extramural funding.
- To develop industry-academic partnerships.
- To facilitate interaction between engineers, computational scientists, and physical and life science researchers.
- To pursue excellence in research, innovation and discovery with focus on life sciences and technology development.

Currently a group of 20 faculties within IIT Mandi with different expertise whose research focus aligns with the vision of the BioX Centre form a core part of the Centre. These include faculties from the School of Basic Sciences (Biologists, Chemists, Mathematicians, Computational Biologists), School of Engineering (Mechanical Engineering), and School of Computing and Electrical Engineering (Computational Engineering and Electrical Engineering).

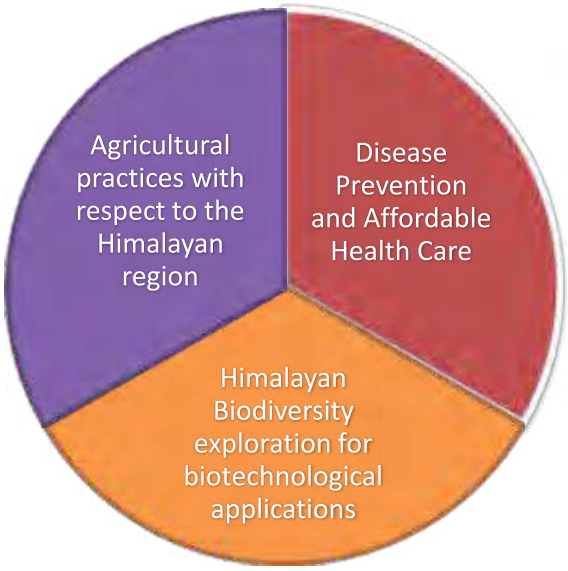


Figure: Thrust areas of research being carried out at IIT Mandi.

The thrust areas of research which are being focused at the centre include:

Disease Prevention and Affordable Health Care

- Biomedical Devices & Instrumentation.
- Biomechanics.
- Biomedical imaging.
- Nanobiotechnology.
- Biomaterials.
- Diagnostics and Therapy for Diseases.

Himalayan Biodiversity exploration for biotechnological applications

- Natural Products Biotechnology For Health and Industry.
- Exploration of Novel microbes (enzymes) in extreme environments for industrial and biotechnological applications.

Agricultural practices with respect to the Himalayan region

- High-throughput phenotyping in agriculture.
- Systems analysis of important crop pathogens for management.

The laboratories and technology platforms that currently exist at the BioX Centre of IIT Mandi include:

- Advanced Materials Research Center (AMRC) (equipped with high end facilities like NMR, Mass-Spec, Single crystal XRD, Confocal Microscope, Spectrophotometers, etc).
- High Performance Computing facility.
- Molecular and Systems biology.
- Nanotechnology.
- Next Generation Sequencing facility.
- Animal House facility.
- Cell and Tissue culture facilities.
- Expanding in other Omics.

Cell and Tissue Culture facilities

Fungal Culture Facilities

Next Generation Sequencing Facility

Gas Chromatography (Mass Spec)

Bioreactor

Fow Cytometer

UV-VIS NIR

Fluorescence Microscope

Stop Flow

Basic Molecular Biology Lab

Systems Biology Lab

Plant Growth Lab

Medicinal Plant Garden

Botanical Garden

Herbarium

Gel doc

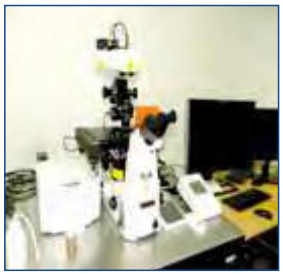
Flux Analyser

Cryostat

Ultracentrifuge

Multiplate reader

- **Advanced Materials Research Center (AMRC)** (equipped with high end facilities like NMR, Mass-Spec, Single crystal XRD, Confocal Microscope, Spectrophotometers, etc)



- **High Performance Computing facility**

Figure: Other research facilities of the institute being used by the researcher of the BioX Centre.

The Centre facilities are also an integral part of the ongoing M.Tech in Biotechnology program of the School of Basic Scneices at IIT Mandi. The M.Tech in Biotechnology programme was started in August 2016 with the goal to train the next generation of students with cutting edge knowledge and skills suitable towards biotechnological research and bio-pharma based industry. M.Tech in Biotechnology programme at IIT Mandi is intended to nurture and train the students with strong interest in research and Bio-industry to meet the existing challenges of the biomedical research/industry. The curriculum is directed towards fundamental and practical understanding of the core biotechnology areas along with specialized fields in the form of specialization programs in "Systems Biology" and "Medical and Nano-biotechnology". In addition, elective courses from other disciplines provide interdisciplinary exposure to the students. The core-subjects, specialized theme areas of BioX, electives from other schools, hands on laboratory training along with the Thesis project component to be undertaken in-house/ other R&D institutes/ industries enrich students with right skills required in the current Job market both in academia and industries, on completion of the program. The first batch of MTech students (8 nos) have already completed their degrees.

The BioX Centre serves as a platform to foster R & D and teaching in several areas of biotechnology, including systems biology, bioinformatics, biophysics of misfolding diseases, Intrinsically Disordered Proteins (IDPs), metabolic engineering, nanobiotechnology, translational medicine, synthetic biology, etc. exploiting their strong synergy with different areas of technology. Currently, more than fifty research scholars pursuing their PhD degree in the related areas, are using the facilities developed at the BioX Centre. The BioX Center faculty have been able to publish their research work in the peer reviewed international journals of high impact. The growth in the number of research articles published by the faculty in the Life Sciences area is given below:

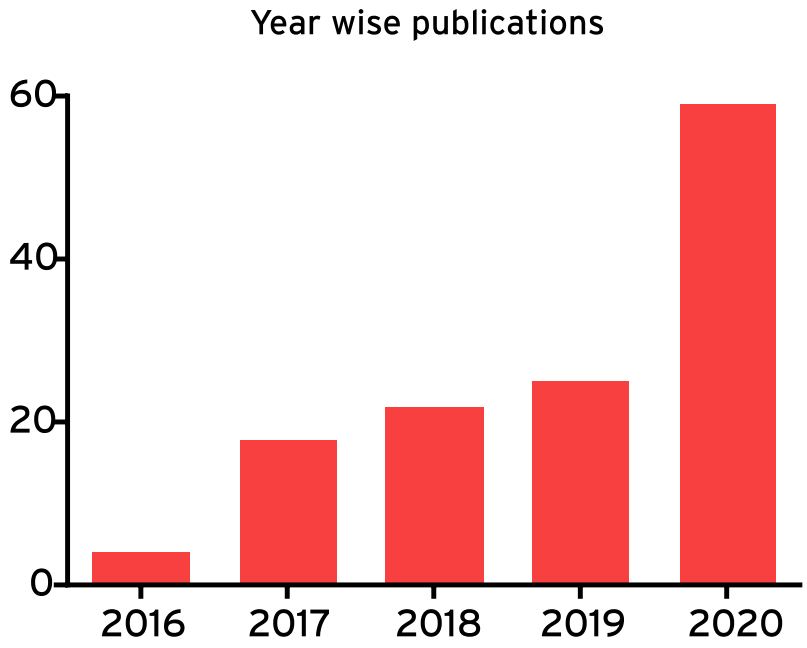


Figure: The growth in the number of publications of the faculty of the BioX Centre in the area of Life Sciences (upto March, 2020).

Publications

Journal

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- The history of mutational pressure changes during the evolution of adeno-associated viruses: A message to gene therapy and DNA-vaccine vectors designers. Khrustalev VV, Khrustaleva TA, Stojarov AN, Sharma N, Bhaskar B, Giri R. Infect Genet Evol. 2019 Oct 31;77:104100.
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Books

- Mondal, S., Ghosh, R. 2020. Pre-clinical Analysis of Implanted Ankle Joint Using Finite Element Method. Advances in Fluid Mechanics and Solid Mechanics, Maity, D et al. (eds). Springer, Lecture notes in Mechanical Engineering.
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Conference Paper

- A. Madhubabu, L.V.R. Prasadaraju, S. Roy Chowdhury, "Classification of Abnormal and Normal Heart Sounds Using the MEMS Based High Performance Phono-Cardio Graphy System", IEEE International Conference on Artificial Intelligence and Signal Processing (AISP 2020), Amravati, January 10-12, 2020.
- P. Garg, P.K. Sonker, K. Shakya, D. Khurana, S. Roy Chowdhury, "Detection of Brain Stroke using Electroence-phalo-graphy (EEG)", 13th IEEE Inter-national Conference on Sensing Technology (ICST) 2017, Sydney, December 2-4, 2019.
- K. Shakya, P. Sonker, S. Roy Chowdhury, "A portable device for measuring Heart Rates in comparison with the pressure applied for light penetration in skin surface", 13th IEEE International Con-ference on Sensing Technology (ICST) 2017, Sydney, December 2-4, 2019.
- Y. Arora, S. Roy Chowdhury, "Assessing the role of electrodes for high-definition transcranial direct current stimulation configurations on cortical excitability in a computational framework", 13th Inter-national Conference on Complex Medical Engineering (CME 2019), Dortmund, Germany, September 23-25, 2019.
- G. Sharma, S. Roy Chowdhury, "Enhan-cement in Focality of Non-Invasive Brain Stimulation through High Definition (HD) Anodal Transcranial Direct Current Stimulation (tDCS) Techniques", 16th IEEE International Conference on Computa-tional Intelligence in Bioinformatics and Computational Biology, Certosa di Pontignano, Siena, Tuscany, Italy, July 9-11, 2019.
- G. Sharma, O. Karwal, S. Roy Chowdhury, "Non Invasive Brain Stimulation (NIBS) Study Based on Ischemic Stroke Patients", 41st Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC 2019), Berlin, Germany, July 23-27, 2019.

Research Project Funded

Title: Function and Mechanisms of sorcin in diet induced fatty liver diseases and lipid metabolism

File Number: CRG/2019/004006;

Duration: Feb,2020- Feb,2023

Budget: INR. 50,75,000

Funding Agency: SERB

Principal Investigator: Dr. Prosenjit Mondal

Title: Development of a non-invasive low-cost portable device for monitoring blood parameters.

Funding Agency: M/S Biofi Medical Healthcare Pvt. Ltd, Bengaluru (2019-2021).

Total budget: 20.07 lacs.

Status: Sanctioned.

Principal Investigator: Dr. Shubhajt Roy Chowdhury

Title: Functional characterization of novel signalling molecules in inter-tissue stress communication.

File Number: BT/HRD/35/02/2006; Ramalinga swami Re-entry Fellowship

Duration: Year 2020 to 2024

Budget: INR. 40,00,000

Principal Investigator: Dr. Prasad Kasturi

Funding Agency: DBT

Title: Evaluation and design of novel synthetic microbial consortia for bioprocessing of rubber and plastic waste to industrial biomolecules

IIT Mandi Reference/ Project No.: IITM/SERB/TPS/283

Sponsoring Agency: SERB

Amount Sanctioned: 41,51,400 INR

Duration of Project: 3 years (19.02.20 to 20.02.23)

Principal Investigator & Co-ordinator(s): Dr. Tulika P Srivastava (PI),

Dr. Shyam Kumar Masakapalli (Co-PI)

Invited Talks

- "Deciphering site-specificcollagen post-translational modifications using high-resolution Mass Spectrometry" at the 11th Annual Meeting of Proteomic Society, India, 2019 (PSI) and International Conference on "Proteomics for System Integrated Bio-Omics, One Health and Food Safety" at Karnal, Haryana, India from December 2nd to 4th, 2019.
- Dr. Shubhajit Roy Chowdhury delivered an invited talk titled "Health Care: Can we have it at home?" at the Department of Electrical Engineering, University at Buffalo, USA, January 29, 2020.
- Dr. Amit Jaiswal delivered an invited talk at the 12th Asia-Pacific Microscopy Conference (APMC-2020) Hyderabad International Convention Centre, 3-7 February 2020, Hyderabad, India.
- Dr. Amit Jaiswal delivered an invited talk at the National Conference on Nanomaterials in Biology (NCNB 2019), Jaipur, India.
- Dr. Amit Jaiswal delivered an expert talk on Nano-Biotechnological Applications of Plasmonic Nanostructures and 2-D Material-based Nanocomposites at Chandigarh University on 2nd September 2019.
- Dr. Amit Jaiswal delivered an expert talk on Nanomaterials for Healthcare & Environmental Applications at The University of Burdwan in Jan 2019.
- Shyam K Masakapalli delivered an invited talk on "Mapping cellular metabolic phenotypes via meta-bolome and fluxome using GC-MS" at ICGEB, New Delhi 21-22nd Feb 2020.
- Shyam K Masakapalli delivered a special lecture titled "Tapping into phytochemical diversity and a journey towards smart agriculture in India" on 10th January 2020 at Central University, Koraput, Odisha (https:// updateodisha.com/2020/01/12 /cuo-holds-lecture-on-tapping-of-phyto chemicals-and-smart-agriculture-655 25/).
- Shyam K Masakapalli delivered an invited talk "Integrating genomics with 13C tracers for efficient mapping of microbial metabolic systems" in the Annual conference of the Biological Engineering Society, BESCON 2019, held from 18-19, October 2019 at IIT Madras (https:// web.iitm.ac.in/besco n2019/speakers. html).

- Shyam K Masakapalli delivered an invited talk -"Introducing 13C Fluxomics and Smart Agriculture in Indian context" on 17th June 2019, IBSE Seminar series, Robert Bosch Centre for Data Sciences and Artificial Intelligence (RBC-DSAI), Indian Institute of Technology Madras (https://ibse.iitm.ac.in/events/2019-06-12-seminar-shyammasakapalli/).
- Naina Arora, Amit Prasad: Immune-modulating excretory secretory Protein of Taeniasolium alters host miRNA function. Keystone Symposia on Helminths: New Insights from Immunity to Global Health December 8 - 12, 2019, Southern Sun Cape Sun, Cape Town, Western Cape, South Africa.
- Naina Arora, Anand Raj, Amit Prasad: In silico prediction of Taeniaso liumkinome and kinases as drugg-abletargets. 30th National Congress Of Parasitology & Global Summit On Malaria Elimination September 26-28, 2019, Jawaharlal Nehru University, New Delhi.
- Amit Prasad, Naina Arora. Taenia-solium Excretory Secretory Protein alters Macrophage Function via Host miRNA Interaction. American Society for Microbiology 2019, San Francisco, USA.
- Amit Prasad, Naina Arora. Immune-suppressing role of Taeniasolium Excretory secretory protein in human host. Molecular Helminthology 2019, San Antonia, USA.

Faculty Achievement

Faculty Achievement

Amit Prasad is selected as Coordinator for Drug discovery Hackathon 2020 Under Prime Minister of India, Gov of India.

BioX Event

- Seminar on Protecting the proteome: protein quality control during stress and aging in C.elegans Speaker: Dr Prasad Kasturi Date: 20/02/2020 A4 conference room.
- BIG Talk via Zoom: Biotech Ignition Grant (BIG) Awareness talk for students and faculty of IIT Mandi. Speaker: Dr Priya Date: February 3, 2020 A4 small conference room.
- Phage display technology to select nanobinders and beyond SBS Seminar on Friday (7th February, 2020) Sharvan Sehrawat, PhD, Department of Biological Science, Indian Institute of Science Education and Research Mohali.
- SBS Seminar 25th February on Identification of druggable targets in advanced phases of Chronic Myeloid Leukemia by using cell lines & patient samples. Soumen Chakraborty, Ph.D. Senior Scientist, Cancer Biology Group, Institute of Life Sciences (an autonomous institute under Depart-ment of Bio-technology, Govt. of India), Bhubaneswar-751023, Odisha.
- Unraveling the spatial organization of chromosomes by single-molecule imaging. Dr. Mahipal Ganji from the group of Prof. Ralf Jungmann) Max-Planck Institute of Biochemistry Martinsried, Germany. 27th February. Thursday 2020.

Student Achievement

- PhD student Kumar Udit Saumya, working with Dr. Rajanish Giri awarded with 'Science and Engineering Research Board (SERB) Overseas Visiting Doctoral Fellowship Program (OVDF)'.
- Khyati (PhD student) graduated (defended her PhD thesis "Design, Synthesis, and Biological Evaluation of Small Molecule Agonist of the Glucagon-Like Peptide-1 Receptor as Antidiabetic Agent "and was awarded PhD degree, September, 2019 Currently Woking as Postdoctoral fellow @ University of Michigan. Ann Arbor.
- Vineeth P Daniel (PhD student) got best poster award at All India Cell Biology Conference 2019 (AICB) @ IISER Mohali 19th-21st Dcember, 2019 conducted by The Indian Society of Cell Biology (ISCB).
- Naina Arora defended her PhD thesis and awarded degree.
- Naina Arora got Keystone Symposia on Molecular and Cellular Biology Future of Science Travel Award for participation in Helminths: New Insights from Immunity to Global Health December 8 - 12, 2019, Southern Sun Cape Sun, Cape Town, Western Cape, South Africa.
- Naina Arora got Springer NatureFirst Prize for Best poster at 30th National Congress Of Parasitology & Global Summit On Malaria Elimination September 26-28, 2019, Jawaharlal Nehru University, New Delhi.
- Mr. Gaurav Sharma and Ms. Yashika Arora were awarded IBRO Fellowship for attending the Summer School on Neuroscience at the Sri Chitra Thirunal Institute of Medical Sciences, Thiruvan-thapuram, April 22 - May 9, 2019.
- Ms. Yashika Arora has been awarded SERB Overseas Visiting Doctoral Fellowship for carrying out colla-borative research at the Department of Biomedical Engineering, University at Buffalo, USA during September 2, 2019 - March 1, 2020.
- Mr. Prem Singh, PhD student of Dr. Amit Jaiswal's group, got selected for the Newton Bhabha PhD Placement Programme (2019 - 20).
- Ms. Manushree (PhD scholar) successfully defended her PhD thesis on "Mapping central carbon metabolism of Xanthomonasory-zaeand Xanthomonascampestrisby integrating Metabolic Systems Biology approaches". She was awarded PhD degree in March 2020 and is currently a Postdoctoral fellow at ICGEB New Delhi.
- Ms. Poonam Jyoti (PhD scholar), received Best Poster award in the Annual meeting of Biological Engineering Society and Conference, IIT Madras, Oct 18th-20th, 2019 (BESCON 2019). The poster is entitled "Integrating genomics and 13C tracer studies to get deeper insights of metabolic features of Ralstoniasolanacearum".
- Mr. Maneesh Lingwan, was selected for SPS Summer School (among 12 international plant scholars) on "Specialized plant metabolites: from analysis to engineering", & "Spec-ialized Metabolites Symposium" June 30 to July 5, 2019 at the Institut Jean-Pierre Bourgin (Centre INRA) France and the Institute of Plant Sciences Paris-Saclay, France. He Presented two oral talks and availed handson experience on LC-MS.

- Ms. Poonam Jyoti (PhD scholar) selected to presented herwork in EMBO|EMBL Symposium: Multiomics to Mechanisms - Challenges in Data Integration, EMBL Heidelberg, Germany, Sep 11th -13th, 2019. Poster presented is "Integrating multiomics approaches to decode the system features of Ralstoniaso-lanacearum".
- Mr.Chandrakant Joshi (PhD scholar) was selected to present his work at International Congress on Thermo-philes, 2-6 September 2019, Fukuoka, Japan. Poster presented is entitled: "Decoding the Metabolic Features of Thermobifidafusca using KEGG Orthology and 13C Mapping".
- Ms. Jyotika and Ms. Shagun (PhD scholars) were shortlisted and attended "4D-GCMS workshop for Biological application"; 21-22nd Feb 2020 at ICGEB, New Delhi.
- Mr. Maneesh Lingwan and Ms. Poonam Jyoti (PhD scholars) embarked on collaborative research with Prof. George Ratcliffe and Prof. Nick Kruger, University of Oxford, UK supported by MHRD-SPARC project – 2019-2021.

6. Research Groups

6.1 UHL: Center for Uplifting Himalayan Livelihood (UHL)

A brief report on Lantana and DPN (Dry Pine Needles)

The Center for Uplifting Himalayan Livelihood (UHL) is a DST funded center at IIT Mandi, in Himachal Pradesh working on socio-technical issues of the Himalayan region in general and H.P. state in particular. The center is currently working on a two DST funded projects entitled "Eco-friendly Utilization of hazardous Pine Needles for social benefits"and"Uplifting hilly livelihood through the eco-friendly utilization of Lantana weed".

A. Eco-friendly utilization of dry pine needle for uplifting rural livelihood

Pine needles cause a major threat to the environment, biodiversity and local economy in the entire Himalayan region due to their non-bio-degradability and highly-inflammable nature. In past few decades, the forest departments of hilly states such as Himachal Pradesh and Uttrakhand have tried various ways for collection and disposal of dry pine needles (DPN) in order to avoid the forest fires caused by them.

After studying various possible ways, we realized that "Pelletization and briquetting" of pine needle biomass is the most eco-friendly and economically viable solution. Center successfully prepared the briquettes and pellets by the different combination of biomasses mixing with DPN. Due to high calorific value and economic viability, the product is ideal for use. Center also filed a patent on DPN briquetting entitled "Biomass Compact Briquette Fuel and its Preparation Method" Patent no. 201811000279, dated 03/01/2018. The brief introduction of the invention is given below:

1. Briquettes and pellets produced at the center

Interestingly, all previous efforts in this direction either applied controlled burning and then compression or mixing of materials like cow dung/soil etc to make fuel. The product made with these techniques is neither of acceptable quality nor easy to make. Based on our observations and understanding we decided to chop and compress the needles at high pressure We succeeded in making very clean, dense and easily manageable briquettes and pellets with pure pine needles and with the mixing of pine needles with many other biomasses.

Fig-1: [DPN briquette]

Fig-2 : [DPN pellets]

2. Chemical analysis of briquettes

Biomass briquettes have higher the value of calorific value as compare to wood. Further, we conducted a variety of fundamental ash analysis tests including elemental ash tests, ash fusion tests and coal ash analysis. Following tables lists the calorific value along with moisture and ash content of the various samples made up of pine needles mixed with wood chips.

Table 1: Calorific value of DPN briquettes (sample: pine + wood chips)

Pine %	Calorific value (Kcal/kg)	Moisture%	Ash%
60	6442.58	6.03	2.77
40	6186.60	6.98	3.18
20	5368.2	7.40	3.09

3. Community involvement

The UHL Center organized awareness programs in nearby Gram-Panchayats for Gram Pradhans. The response and acceptance of the product are very good.

Fig-5: Interaction with Gram Pradhan's

Fig-6: Interaction with Gram Pradhan's

Through this project, the centre unarguably intends to create livelihood opportunities among local communities by conducting relevant workshops so that the upcoming generation can take up the newly created entrepreneurial possibilities to not only meet their livelihood requirements but also contribute in solving the age-old forest fire problem of the Himalayas mainly happening due to pine needles.

4. Government policy on DPN based briquette plant

Taking advantage of our research leading to an eco friendly solution for utilization of hazardous pine needles, Department of Forest, Government of HP announced a policy. The important points of the policy are as following:

- Govt. will provide subsidy of 50% of capital cost upto Rs. Twenty five lakhs per unit (also include shed).

- No charges will be payable to the forest department for the collection and utilization of dry pine needle.
- Forest department can also help for the collection and transportation of pine needle by providing funds from their forest fire protection scheme fund.
- The collection and transportation can be done by the help of Panchayati Raj bodies, Mahila Mandals, Yuvak clubs, NGOs, right holders or village forest management societies (VFMS) etc.

  Till now, four briquetting plants are in working conditions and about 15 more application have been approved for the briquetting plant under thee new pine needle subsidy policy of Himachal Pradesh government.

B. Bio-fuel of menace weed Lantana

Status of Lantana in Himachal Pradesh

Lantana is spreading very fast in Himachal Pradesh. According to the survey done by the forest department in 2015, the total area covered by Lantana in Himachal is more than 2, 30,000 hectare. A survey was also carried out during 2011-12 and 2015-16 to know the extent and level of invasion. The seven territorial circles namely Dharmashala, Nahan, Hamirpur, Chamba, Bilaspur Mandi and Shimla have a significant infestation of Lantana.The intensity wise forest area infected with Lantana in the state is given in table 2 (according to the study of 2015), and the availability of lantana in Himachal Pradesh is also given in table 3.

Table 2: Intensity of Lantana in H.P.

Intensity	Area(ha)	Percentage
<25%	53203.82	22.59
25%-50%	68244.03	28.98
50%-75%	73778.35	31.32
>75%	40285.75	17.11
Total	235491.75	100

Table 3: Lantana availability circle wise (based on January-March 2011)

Circle	Forest Area under the Invasion of Lantana (In hectare)
Nahan	21,456.99
Bilaspur	55,941.55
Mandi	7,900.00
Hamirpur	12,680.00
Dharamshala	47,403.00
Shimla	4,060.89
Rampur	0.00
Chamba	4,631.77
Kullu	575.70

Unfortunately, there is no good viable solution for eco-friendly lantana management. Now, HP Forest Department is collaborating with IIT Mandi to find some solution. Following steps need to be achieved in a sustainable manner for the use of Lantana biomass:

- Comparative study on the use of lantana in various ways.
- Designing a low-cost tool for the collection and chopping of lantana.
- Briquetting/ pelletization of lantana potential available in Himachal Pradesh.
- Laboratory analysis of biomass briquettes/ pellets and trial studies on the usage of briquette /pellets.

Based on our collaborative effort and understanding so far, after exploring all possible usages of lantana like furniture, oil extraction etc, it seems that making bio-fuel in the form of briquettes/pellets of lantana can be a better and viable solution. Recently, IIT Mandi has been successful in making the bio-fuel out of lantana bio mass. The initial studies indicate that it can be a good substitute to be used in any industry which requires the burning of coal/wood. Its use as domestic fuel is yet to be evaluated.

Interestingly, all previous efforts in eradication of lantana have been either hand pulling, slashing/chopping of the stems, control burning and manual grubbing with substantial removal of the root system etc to remove lantana. These methods had no or little effect in controlling the spread of lantana infestation, due to their inherent limitations and absence of an integrated control strategy. Making bio-fuel seems to be a possible and viable way as a sustainable solution. The figure below shows the chopping tool we found highly suitable and the bio-fuel samples IIT Mandi has made.

Pruner	Uprooter	Lantana Briquettes	Lantana + Pine needle briquettes
			

The table below shows the calorific value of briquettes that is the heat liberated when the solid fuel undergoes complete combustion in oxygen.

Table 4: Calorific value of Lantana briquettes (sample: lantana +pine needle)

Lantana %	Calorific value (Kcal/kg)	Moisture%
100	5761.69	8
50	5120.27	7

6.2 Design and Innovation Centre; Patents, Design and Innovation Culture

The Design Innovation Centre at IIT Mandi provides necessary ecosystem for graduates and research scholar to develop much needed skills that are required to design and develop products and technologies. Since India is moving towards "Make in India" policy and IIT Mandi's mission and vision are coherent with the country vision, our institute attempt to produce graduates and research scholars with skills that would enable them to think independently in terms of creativity and innovation. With the conviction that technological innovation constitutes an essential element for achieving progressive development and permanent improvement in any activity, state-of-the-art design centreis being set-up in the campus funded by MHRD. Since the next wave of economic growth globally will be led by innovation and entrepreneurship, this would be the key economic driver for India in the coming years.

The Design and Innovation Centre is a Rs. 1.6 crore project funded by the Ministry of Human Resource Development, Govt. of India. The centre is equipped enough to support the prototype and product development endeavors of the students and faculty members of IIT Mandi. Facilities like 3D printer, PCB fabrication unit, magnetic stirrers, Elvis System Development board and other development and test facilities are available at the centre. The institute is all set to provide easy access of the centre to its students round the clock.

The centre is coordinated by Dr. Shubhajit Roy Chowdhury (School of Computing and Electrical Engineering) along with Dr. Md. Talha, Dr. Atul Dhar, Dr. Kaustav Sarkar (School of Engineering) and Dr. Shyam Kumar Masakapalli (School of Basic Sciences).

The centre organized an open house on May 22, 2019 to exhibit the students' projects. The following projects were demonstrated during the open house among others:

1. Trajectory tracking of a redundant rotor tail sitter UAV

Team Member: Preethi Kannapan

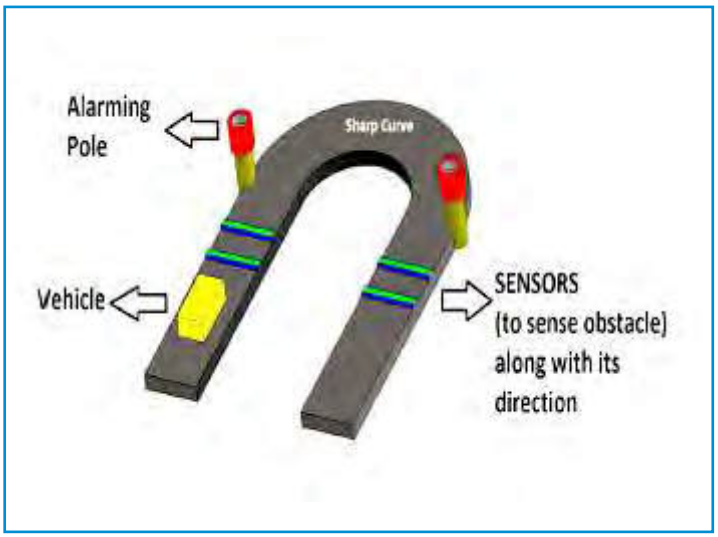
Advisors: Dr. Tushar Jain and Dr. Gaurav Bhutani

Abstract: UAV is an acronym used for Un-manned Aerial Vehicle, which is an aircraft with no pilot on board. The proposed UAV is a remotely operated tail sitter UAV. Tail sitter UAVs can take-off and land vertically while cruising horizontally without the need for relative tilting of rotors or wings with respect to the body. The novel aspect of this project is the redundancy in the number of rotors along with trajectory tracking capabilities which allows for fault tolerance with respect to rotor failure, flexible battery power management and safe landing in the case of low battery. This project aims at modeling and simulation of the dynamics of the UAV prototype, implementation of control algorithms for take-off, cruising, landing, trajectory tracking, and redundant rotor control.

2. Smart Accident Free Roads

Team Members: Amudhan M, Naman Chaudhary, Shishir AsthanaAdvisors: Dr. Kala Venkata Uday

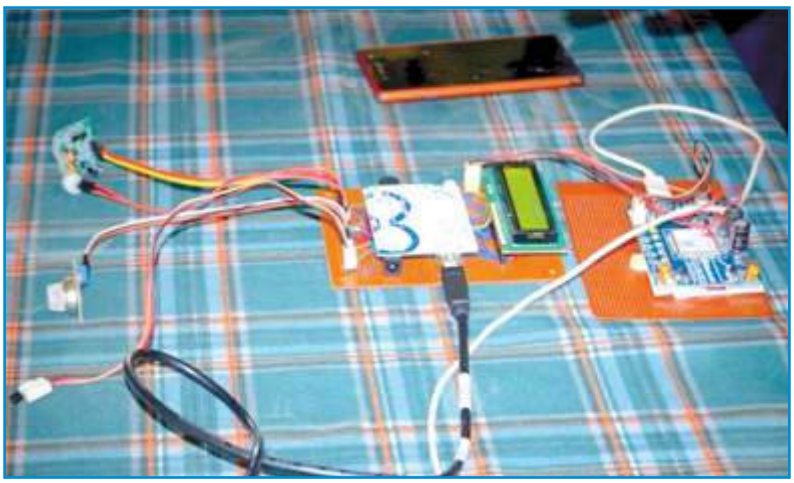
Abstract: Road accidents are a major concern to the entire world as they result in loss of property and hundreds of lives each year. The main reason is lack of awareness required while driving, especially on sharp curves where you are blind of what is on the other side. There have been serious and fatal accidents reported in such blind curves and majorly in hilly terrains. Keeping this in view, the project aims to alert/inform the driver approaching such curves about the hindrance, in any, approaching at the blind curves adding possible safety to the drive. The project aims alerting every individual on the turns (either walking or driving). As Himachal Pradesh is one of the hilly states with many such turns and curves, the market for such product is immense, to the best of our knowledge. Also adding to the fact that the state has limited rail and air connectivity, majority of the transportation is by roads with number of blind curves.



3. GSM Based Security Alert System

Team Members: Bodhayan Nandi, Prateek Kumar Sonker, Yamini Sharma, Yashika Arora

Advisor: Dr. Shubhajit Roy Chowdhury



Abstract: The project aims at building a GSM based home security system for alerting the user with SMS message in case of security breaches. It aims at real time monitoring of common household hazards and unauthorized intrusion. The system sends SMS alert to owner of the house at anytime from anywhere in case of a problem. The system is battery powered, hence no dependence on power failure issues.

4. Coordinated Multi-robot exploration and mapping

Team Members: Aditi Mann, V. Sai Subba Rao

Advisors: Dr. Arpan Gupta and Dr. Tushar Jain

Abstract: Through this project we seek to take the first steps in exploring the usability of multiple UAVs in the fields of Search & Rescue and construction. To begin with we seek to model the dynamics of the group behavior of swarm robots and analyze them. Subsequent to the development of dynamic model, coordination control and synchronization problem would be addressed and implemented on a swarm of quadcopters, of size of about four. During this process we shall explore various control paradigms - time optimal, fuel optimal, graph based approaches, etc for addressing the agents synchronization problem.

Among the projects, the project on Smart Roads went a step ahead and led to the opening of a start-up named Smart Roads. The infrastructure was also upgraded to include a 3D scanner. Currently the process is on to procure a Virtual Reality tool.

6.3 Multimedia, Analytics, Networks and Systems (MANAS)

The multimedia, analytics, networks, and systems (MANAS) group at IIT Mandi broadly focuses data acquisition and on extracting useful information from various types of data including images, audio and video streams, social networks, documented records etc. The group is currently looking at topics on computer vision, medical image analysis, speech and audio signal processing, IoT and embedded systems.

Recent Activities in the MANAS Group Includes

- Project is sanctioned for Classification of Sonar Signals using Deep Convolutional Neural Networks by DRDO (Rs 16 lakhs, Padmanabhan Rajan: PI, AD Dileep: Co-PI).
- Project for Multimodal Bird Analytics, Sanctioned by National Mission on Himalayan Studies (Rs 32 lakhs, Padmanabhan Rajan: PI, Arnav Bhavsar, AD Dileep: Co-PIs).
- Project for low-cost MEMS-based and Video-based Monitoring and Early Warning System for Rainfall Induced Landslides (Rs 40 lakhs, Arnav Bhavsar: co-PI).
- NM-ICPS TIH Grant (7.25 cr initial grant, MANAS Co-PIs: Arnav Bhavsar, AD Dileep, Srikant Srinavasan, Aditya Nigam, Anil Sao).
- Project is sanctioned for "Distributed Algorithms for Formal Concept Analysis" under SPARC scheme by MHRD (Rs 42.6 lakhs, Sriram Kailasam: PI, Astrid: Co-PI).

Workshops organized

- 15th Winter School on Speech and Audio Processing, Jan 8-10, 2020.
- Workshop on Applied Deep Learning, July 1-5, 2019.

trajectory tracking capabilities which allows for fault tolerance with respect to rotor failure, flexible battery power management and safe landing in the case of low battery. This project aims at modeling and simulation of the dynamics of the UAV prototype, implementation of control algorithms for take-off, cruising, landing, trajectory tracking, and redundant rotor control.

6.4 Condensed Matter Physics

School of Basic Sciences (SBS) consists a strong group of young and dynamic faculty in the active field of Condensed Matter Physics (CMP). At present, there are total nine faculty memberswhose research mainly focuses on the study of physical properties of materials, through diverse experimental and theoretical tools. The faculty members working in the experimental condensed matter physics are Dr. Ajay Soni, Dr. Bindu Radhamany, Dr. C.S.Yadav, Dr. Kaustav Mukherjee, Dr. Pradeep Kumar, and Dr Suman K. Pal. The theoretical condensed matter physics group consists of Dr. Arti Kashyap, Dr. Girish Sharma and Dr. Sudhir K. Pandey. In total, there are more than 60 researchers (including faculty members, PhD students and Project associates) who are working in the exploration of the different aspects of condensed matter physics at IIT Mandi.

CMP members are working on almost all the state-of-the-artareas of interest in the field and studying various interesting physical phenomena and materials. The focus of the research activity is three fold; (i) Understanding the underlying physics of the various phase transitions and material properties, (ii) Exploratory research for new materials and (iii) Applied physics for future application in energy and nanoelectronics. These areas can be roughly categorized as follows:Based on the nature of work

1. Superconductivity, Topological matter.
2. Electron-Electron Correlation, Spin Phonon Coupling.
3. Multiferroics, Magnetocalorics, Heusler Alloys.
4. Nano-Science, Optoelectronics, Functional Devices.
5. Thermoelectrics, Energy Materials, Organic Electronics.
6. Soft Condensed Matter Physics.
7. Electronic Band Structural Calculation.
8. Correlated and disordered electronic systems, Phase transition.
9. Theoretical condensed matter physics.

In the year 2019-2020, CMP members have published more than 60 research articles in the reputed research journals of the field. The major research journals are Physical Review B, Physical Review Research,npj 2d materials and applications, Solar Energy, Euro Phys. Letter, J. Phys. Chem. Lett., J. Phys: Cond. Matter, J. Magn.& Mag. Mater., Solid State Comm., Appl. Phys. Lett., J. Phys. D: Appl. Phys., AIP Advances, J. Alloy and Comp., Appl. Ener. Mater.,Materials Express, J. Phys. Chem. Letter, Organic Electronics, Materials Letter, Computation Material Science, RSC Energ. Env. Sci., JACS and Adv. Funct. Mater.There have been very active representation of CMP members in various reputed national and International conferences, where the faculty and research scholars have presented their work in the form of invited/contributory talks, and poster etc.Scholar Amir won best poster award in CAMNP 2019 and SMST 2020 held at DTU, Delhi and IIT Goa respectively. Some representative results of eth research work are given below:

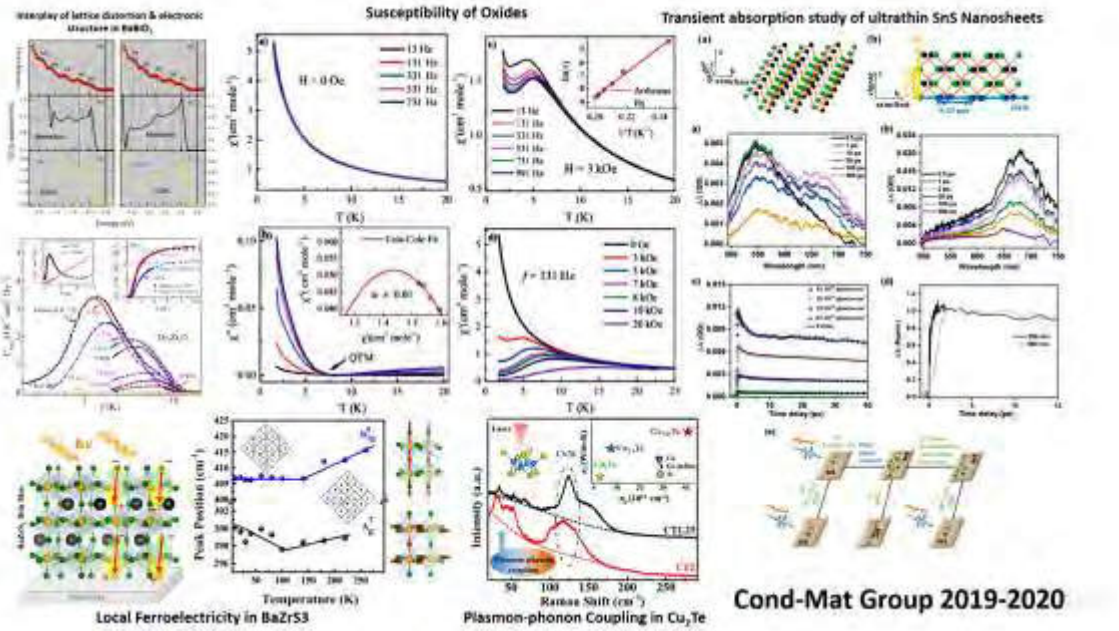


Figure: Some results from the research work published by CMP members.

Currently, the group members are pursuing ~ 15 funded research projects of total worth more than 3 Crore from various external-funding agencies like DST-SERB, CSIR, BRNS, UGC-DAE CSR, DST-INSPIRE, Indo-Sweden and Indo-Russia bilateral grants, and DRDO.

7. SUMMER INTERNSHIP PROGRAMME

IIT Mandi organized “SUMMER INTERNSHIP” 2019, this year. In this year 42 interns were invited for summer internship, based on recommendations from selected advisors in different areas like Biosensors Material and properties, Photocatalysis, Biomedical Engineering, Computational Chemistry, Theoretical Chemistry, Condensed Matter Physics/Materials Science, CMOS Analog IC design, Controllability of Differential Equations with Applications in Engineering and fluid solid interaction problems, Computational Fluid Dynamics, Control Systems, Deep Learning application in biometrics and medical imaging, Discrete element modelling (DEM) of granular flows, Differential Equations, Mathematical Modelling, Earthquake Engineering, Energy Conversion and storage, Electrodynamics, Experimental Physics and Nanosciences, Experimental Condensed Matter Physics, Fluid and Thermal Science, Financial Inclusion, Financial Literacy, Business Correspondent Model of Banking, Digital Identity (Aadhaar), Fluid Mechanics and Solid Mechanics, Geotechnical Engineering, Gene Regulation, Sensors in Geotechnical engineering, Hydraulics, Environmental, Water resources, Host-Pathogen Interaction, Soil microbiology and its application in landslide mitigation, Investigations of drop impact onto a liquid pool, Landslide study, Nano-Biotechnology, Physical Chemistry, Nanotechnology, Fluorescence Spectroscopy, Bioimaging, Microscopy, Protein folding and Aggregation, Power Electronic Applications, RF and Microwave propagation and device design, Semiconductor Devices, Solid Mechanics, Mechanical Design; Biomechanics, Structural Mechanics, Thermal management of microelectronics, Wireless networks and IoT.

The internship held in the month of May, June and July 2019 for 8 weeks. The internship includes free hostel accommodation and a stipend of Rs.10,000/- .

8. CENTRAL LIBRARY

Central Library plays a vital role in furthering the academic and research mission of IIT Mandi and facilitates creation and dissemination of knowledge. Library provides essential support by offering current library services which are integrated with teaching, learning and research activities. Central library is rapidly developing its collection of books, reference books, reports, periodicals, and electronic resources. The Text Book Collection in the Library provides vital supports for on-going undergraduate teaching programs.

It provides access to the various e-journals databases. This includes access to hundreds of journal titles on different subjects. Central Library is completely automated by using open source library management software KOHA. All documents are RFID technology enabled. Transaction of books is also automated. Library has introduced various innovative services including CAS/SDI, On-line status of ILL, On-line reservation of books, Remote access of resources etc. By using Web OPAC, users can check their borrowing details online. Two workstations have been set up for users to access library holdings.

Locations

At present three different units of library are operational at two different campuses i.e. South Campus and North Campus. Detail of these libraries are given below:

1. **Central Library @ North Campus (A16 Building)**

   Maximum collection pertaining to the print books are available within this unit. Almost all collection related to the different course subjects except Physics, Chemistry and Biotechnology are available within this building for circulation purpose. A16 is a big building having three floors having 192 seating capacity.

2. **Satellite Library @ North Campus (A12 Building – Top Floor)**

   Satellite Library has facility of low voice discussion reading room with 50 seating capacity.

3. **Library @ South Campus (A5 Building – First Floor)**

   Book Circulation facility alongwith the Reading room with almost 75 seats are available within this section. Collection pertaining to the different courses (Physics, Chemistry and Biotechnology) is available for circulation alongwith the Xerox and scanning facility are also available in this unit.

Software Used in Library:

(i) **KOHA:** For automation purpose.

(ii) **DSpace:** For digitization purpose.

(iii) **Linux:** For operating system.

(iv) **Piwigo:** For photographs repository

1. **Collection Development and Management**

   Collection building is one of the important functions of the library that supports academic and research work of the students, faculty, staff, and other users. Library collection comprises of books, journals, reports, pamphlets and other reading material in science, engineering, technology, humanities and social sciences.

1.1 Print Documents added during the year 2019-20

During the period of 2019-20, Central Library acquired 694 books. Total collection for print books reached to 19777. It also addedfew periodicals/ magazines, besides reprints, technical reports and annual reports of other universities/institutions.

A list of new additions of books is released every month and can be accessed on the library home page. This list also circulated by e-mail. An email alert is also sent to the requesting faculty members(s) about the arrival of publications requested by them.

1.2 Electronic resources subscribed during the year 2019-20

Central Library provides web-based access to the following e-resources:

1.2.1 Full-text e-journals: Access to 10000+ full-text journals from the following databases:

AIP,ACM Digital Library, ACS, APS, ASME, Cell Press, IOP, Elsevier's ScienceDirect, IEEE Electronic Library, JSTOR, SIAM, Springer Link, Taylor & Francis (S&T complete Collection), Nature, Annual Reviews etc.

1.2.2 Bibliographic e-databases: SciFinder,MathSciNet& Web of Science.

1.2.3 Thesis & Dissertations: Proquest Dissertation and Thesis Database, Institute's Thesis Database, etc.

1.2.4 Standards: BIS Standards, IEEE Standards.

1.2.5 Archives: Institutional Archives, Sabin Americana.

1.2.6 Video Resources: Jove – Biology, Chemistry, Biochemistry, Bioengineering, Immunology and Engineering collection.

1.2.7 E-Books: Central Library provides access to a collection of more than 19622 e-Books in various disciplines. The e-book collection contains the titles which are a rigorous recommendation by the subject experts of the institute and cater to the needs of the users. The publishers of e-books collection include Science-Direct (Elsevier), McGraw Hill, Pearson, T&F, IEEE,IEEE-MIT press, IEEE-Wiley, Morgan Claypool, CUP, ASME, World Scientific and John Wiley. The e-books collection also includes the Lecture Notes Series on Mathematics (LNM), Physics (LNP) & Computer Science (LNCS) of Springer publisher.

The process of e-book collection development for this year has already been started. The efforts are being made to include the book collection of other renowned publishing houses.

2. Circulation

Circulation activities are now automated. Library users can check their borrowing details by using WebOPAC. We serve the users consisting of the faculty, research scholars, students and staff. Circulation desk is kept open for 60 hours a week. On an average, the monthly circulation transactions are about 1500.

3. Digital Library

Central Library has its own homepage (http://library.iitmandi.ac.in/), which provides web-based access to its resources, procures over 20000 electronic journals, 21468 electronic books and databases.

4. OPAC (On-line Public Access Catalogue)

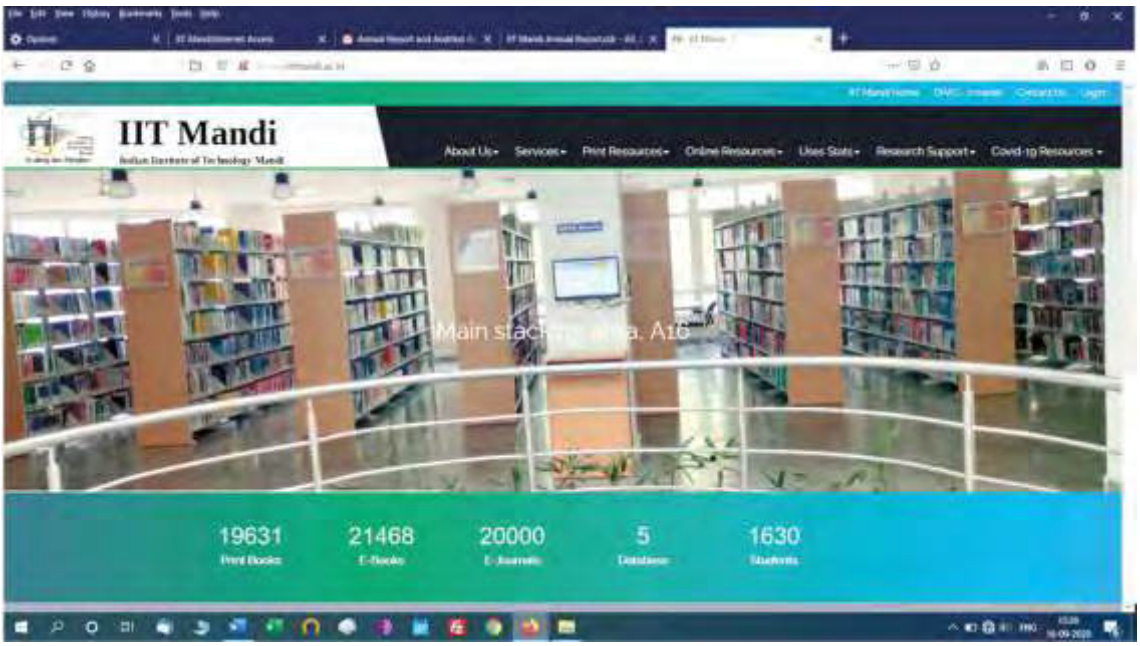
The OPAC is one of the most heavily used databases of the library and is accessible 24*7 via library web page (http//www.webopac.iitmandi.ac.in/). Besides listing all the documents available in the library, it allows on-line renewal and reservation, circulation and tells the current status of each & every book. OPAC is searchable by author, title, accession number, subject and several other fields.

5. Services Offered

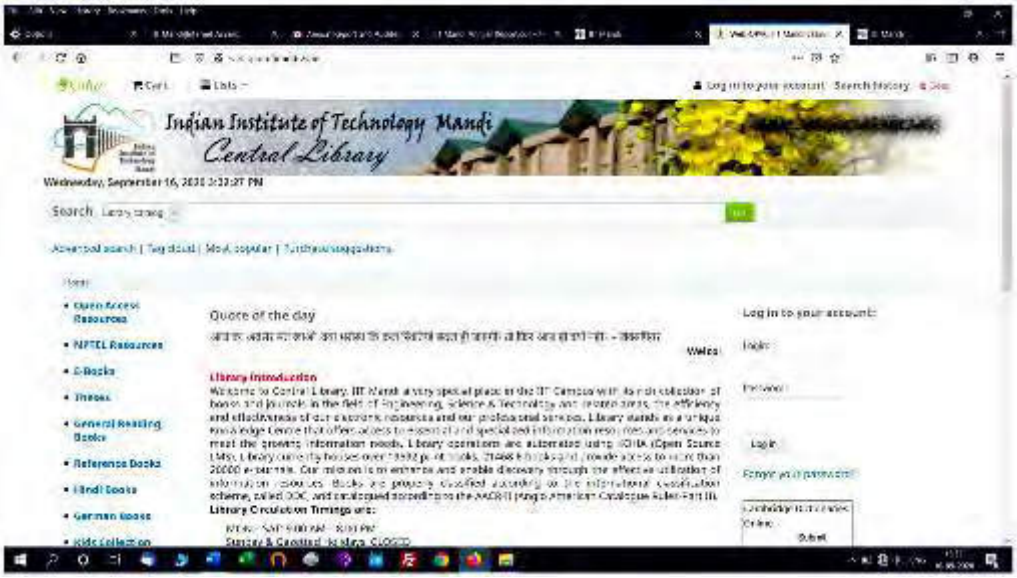
- Fully automated Circulation facility.
- Online book reservation, Information search, Patron's library book loan status check.
- WebOPAC (Web based Online Public Access catalogue).
- Reserve collection development for student's in-house reading.
- New Arrival Book Section.
- Reference Service.
- Inter-Library Loan.
- Document Delivery Service.
- Information Alert Services.
- E-Journals/Databases.
- Digital library services.
- User education program.
- Mobile App Services.
- Research Support Service.
- Remote Access Service.
- RFID.
- Subject Guides.
- Faculty Research Data.
- Institutional Repository.
- Institutional Archives.

6. Future Plans

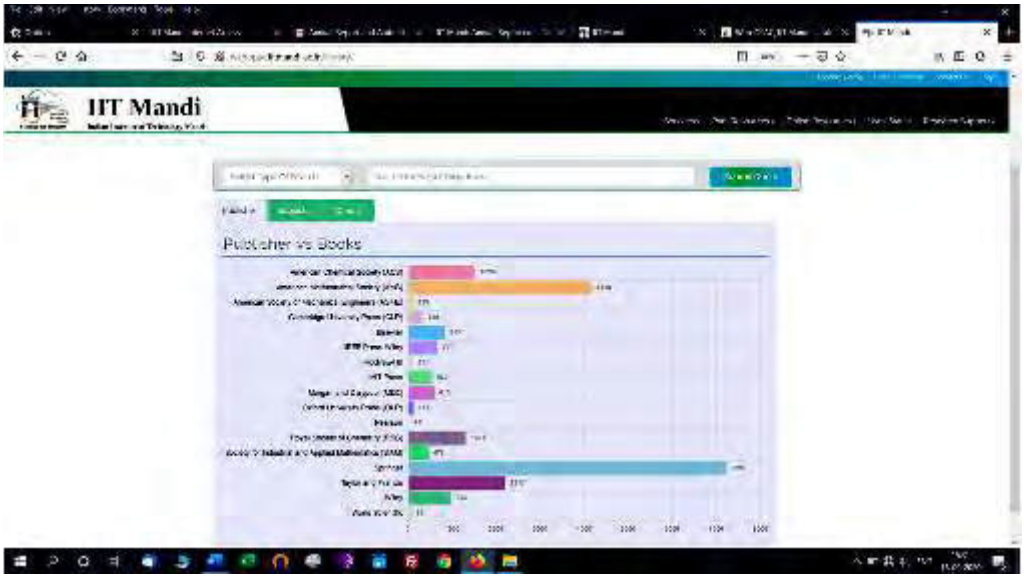
- Single Search solution.
- Online recommendation platform for different library resources.



Library Home Page



WEB OPAC



E-Book Portal

Institutional Repository Portal

9. SEVENTH CONVOCATION

The 7th Convocation of the Institute was held in the Institute Auditorium on 5th October. The graduands were inspired by the speeches of Shri Baba Neelkanth Kalyani, Padma Bhushan, Chairman and Managing Director, Bharat Forge Ltd., Chief Guest and Shri Subodh Bhargava, Chairperson, Board of Governors, IIT Mandi & Former Chairman, TATA Communications Limited. As part of this Convocation 130 B.Tech.students, 60 M.Tech., 54 M.Sc. (Chemistry, Mathematics, Physics), 10 M.S. (by Research) and 22 Ph.D. Scholars graduated from the Institute.

Awards	Student
President of India Gold Medal	Akash Sharma (B15206)
Director's Gold Medal	Abhishek (B15103)
Institute Silver Medal: CE	Tushar Aggarwal (B15423)
Institute Silver Medal:CSE	Akash Sharma (B15206)
Institute Silver Medal:EE	Sumit Patidar (B15237)
Institute Silver Medal:ME	Preeti M Kannapan (B15327)
Rani Gonsalves Memorial Medal	Preeti M Kannapan (B15327)
Institute Silver Medal (M.Sc. (Chemistry)	Gayatri Batra (V17001)
Outstanding Academic Achievement Award (M.Sc. Maths)	Rakesh Kumar (V17048)
Outstanding Academic Achievement Award (M.Sc. Physics)	Ravi Kumar Sharma (V17085)
Outstanding Academic Achievement Award (M.Tech. Biotech)	Sucheta Ghosh (T17074)
Outstanding Academic Achievement Award (M.Tech. in CSP)	Vartika Sengar (T17133)
Outstanding Academic Achievement Award (M.Tech. in EEM)	Aayush Trivedi (T17021)

10. STUDENTS AMENITITES AND ACTIVITIES

10.1 Gymkhana Activities

INTER COLLEGE EVENTS

RUVAAN - INTER COLLEGE LITFEST

(Literary Society)

The first-ever Inter College Literature Festival of IIT Mandi was organized on 29th Feb and 1st March 2020. This replaced the annual Intra college Literature Fest of the college. The fest featured a battle of wits and fluency in a wide variety of literary arts - Poetry Slams, Model United Nations, Quizzes, Story writing, Youth Parliament, and debates. The fest witnessed enthused participation from students of colleges in the region and was successful in indulging the faculty and the students of our institute as well. There were a total of 71 participants from outside and about 350 participants from the college. The major theme of the fest was "Lafzon ka Karwan" which literally means Caravan of words. All the events were successfully carried under the guidance and support of Dr. Surya Prakash Upadhyay (Faculty Advisor, Ruvaan).

The major highlights of the fest are mentioned below:

Pronite 1: Stand-up Comedy: This was a houseful comedy night by Ravi Gupta, a comedian from Uttar Pradesh. Ravi Gupta also known as Shudh Desi Comic is one of the most entertaining comedians in India with over 20 million views on Youtube and Facebook. The event witnessed a jam-packed auditorium with a full package of jokes and laughter.

Pronite 2: Kavyanjali (Kavi-Sammelan): With the help of Dr. Deepak Swami, the first-ever Kavi-Sammelan of IIT Mandi was organized on 1st March 2020. Seven different poets (Mrs. Rekha Bhardwaj from Mandi, Mr. Ajay from Mandi, Mr. Vineet Pandey from Delhi, Mr. Shivam Mishra from Delhi, Mr. Abhimanyu Raj from BHU, Mr. Shubham Pandey from IIT Jodhpur, and Dr. Deepak Swami from IIT Mandi) presented the best of poetry on stage and left all the literature lovers in the college spellbound.

Events: This fest was the culmination of debating, writing, and quizzing events. There were quizzes (Mela quiz, Sports Quiz, India Quiz), debating events (Model United Nations, Parliamentary Debate), word Games (Jung-e-alfaaz), poetry slams and open mic (Verses vs Verses, Open mic), writing events(Spill your Story, Literary Drama) and some witty spoken events(Vyarth Shashtra, Biggest Liar, Recon).

10.2 Physical Education and Sports

AGAAZ INTER YEAR TOURNAMENT (SPORTS)

Students every year awaits for this events because it provide them opportunity to establish their supremacy of their batch in sports arena. Last year it was organized on an elaborate scale. The competitions were keenly fought and the general championship trophy was won by B.Tech third year and PG finished runner up. The event was held during 11th and 12th May 2019.

UTKARSH 2019
(Technical Society)

Utkarsh is IIT Mandi's intra college tech fest in odd semester. It was held on 2nd and 3rd of November 2019. Closing ceremony was held on 10th November, 2019 in presence of Director, Dean Students and Chief Guest from Linux Foundation. Under Utkarsh many different events were held conducted by various clubs under Science and Technology Council (SNTC) as described below:

What's Up

Date: 5th November 2019

This event is related to observational astronomy. It comprises three rounds. In the first round, participants were supposed to identify a few objects in the sky. In the second round, they needed to align the object through a telescope. In the last round, students had to answer a few questions related to astronomy. Jupiter Opposition

We organized a telescope observational session on the night of 10th June 2019 as it was the day when Jupiter can be viewed most clearly from earth. The session was held at OAT(South Campus) and with our 6" telescope, we were able to see Jupiter and it's four big moons distinctively. Around 20 students were present there to attend the event and we told them about what is opposition, arms of the Milky Way Galaxy and facts about the moons of Jupiter.

Curiosity, The Astro-Quiz

Date: 3rd November 2019

Curiosity dealt with concepts of astronomy, cosmology and astrophysics. The objective of Curiosity was to inculcate curiosity regarding application of science in astronomy. Around 20 students participated in the quiz.

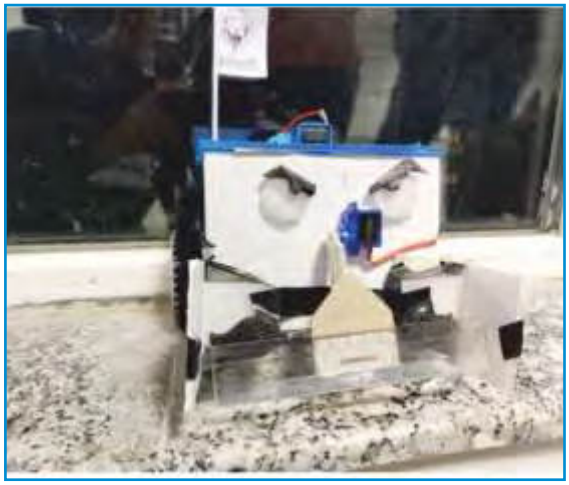
Maze Solver

Date: 2nd November 2019

The competition was held on 3rd November '19, the Second day of Utkarsh '19, the intra-college technical festival of IIT Mandi by Robotronics Club. Venue for the competition was A16. Students were given a problem statement according to which they had to build a maze solving robot. It was kept open for the first year (B.Tech) and 23 teams with 3-5 members in each team took part in the event. Prizes were kept for the top three teams.

Robo - Soccer

Date: 2nd November 2019



The competition was held on 2nd November '19, the first day of Utkarsh '19, the intra-college technical festival of IIT Mandi by Robotronics Club. Venue for the competition was A16.

Students were given a problem statement according to which they had to build a soccer-playing robot. It was kept open for the first year (B.Tech) and 23 teams with 3-5 members in each team took part in the event. Prizes were kept for the top three teams.

Capture The Stone

Date: 2nd November 2019

The event "Crack The Code" is a Capture The Flag (CTF) event, where you need to use the given problem details to exploit security vulnerabilities to find the flags for each question. The flag behind these levels is what you are looking for. This was the third CTF competition ever at our college. The platform for the event was made by Abhigyan Khaund, and the questions were prepared by Prakhar Uniyal, Akshat Malviya, Rishi Sharma and Prajjwal Jha.

GitHero

Date: 3rd November 2019

GitHero was an event where students had to use their git skills to complete tasks and gain points. There were 4 tasks which the students had to complete and a final scoreboard was prepared. This event was a part of Utkarsh 2019.

Viaduct

Date: 3rd November 2019

Viaduct is a bridge making competition which was held during Utkarsh'19 on 3rd November. Students from different years and different branches participated in this event. Objective of the event was to design a bridge (using ice-cream sticks and glue) which can sustain maximum load.

Plot It

Date: 2nd November 2019

This was one of the best and joyful event of Nirmaan Club in which participants had to find the area of a given field by using Plane Table Survey method of Surveying .Calculation of area was to be done manually by participants while organizers calculated its area using software and judged on basis of accuracy of area and perimeter. Total 5 teams participated, and they performed very well as we can see from their answers. 3 teams were from PG and 2 were from UG. Organizers also arranged for snacks. Event finished within 3 hours.

CADx

Date: 3rd November 2019

CADx is a designing competition. Which is organized by NIRMAAN CLUB in Utkrash'19. In this competition, participants had to design a single floor of a residential building in AutoCAD software and also made a rough floor plan on a sheet of graph paper by pencil and scale. In this event, the participant can make a team with a maximum of 3 members and they can also participate individually. Total 25 students are participant including 1st year, 2nd year, 3rd-year B.tech student. Along with B.tech Students, 5 M.tech students also participate in the competition.

Viaduct

Date: 2nd November 2019

Junkyard Wars was held during Utkarsh'19 on 2nd November in which students were provided with different materials and they had to form a product out of it. It was organised by Yantrik Club.

Aakruti

Date: 3rd November 2019

It was a Cad competition organised by the Yantrik club in Utkarsh 2019. This was a one day event in which students were given problem statements on real life applications for which they had to design the solution product. About 30 students participated in teams of 4 or less members in the Event.

The Case Study

Date: 3rd November 2019

E-Cell conducted the event "The Case Study" on the 3rd of November as a part of the intra college technical festival Utkarsh 19. Around 6 teams of 4 members, each showed up for the initial introductory session held on 1st November, out of which 4 teams were able to present their final presentation on the event day. The topic of the event was "Tackling Plastic Pollution".

The motive of this event was to introduce the practice of case study to those unfamiliar with it and the introductory session was kept accordingly for the participants. This was apparently the first-ever edition of the competition by our club and was fruitful considering that one of the winners from the first year along with our team members went on to participate in the case study competition held at the Inter-IIT tech meet and they were able to win a bronze medal for the college.

D.I.S.R.U.P.T.

Date: 2nd November 2019

D.I.S.R.U.P.T. is an idea triggering and a fun way of generating new ideas for a startup. It is a fancy abbreviation for Derive, Include, Separate, Repurpose, Unite, Transplant.

There is a very close link between innovation and entrepreneurship, this event was all about that. It brings out creative and inventive thinking even in most conventional minds. Triggers(like derive, include, etc.) were announced and random object cards(portraying bottle, bike, bags, etc.) were flashed towards the audience. Each team had to generate the maximum number of ideas for a given trigger and object in a given time frame. The team having the best ideas were announced as winners. Around 10 teams having 4 to 5 members each turned up for this event and scratched their heads for the best of ideas. The top 3 teams were given prizes.

ASTRAX 2020

(Technical Society)

The second inter-college Astro-Meet of north India, AstraX'20, was organized from 13th to 15th March 2020 by STAC. The fest witnessed insightful keynote talks, amazing events, a solar astronomy workshop for the participants, and a python workshop for local school students of Mandi. Arshita Kalra and Shikha Suman were the Convenors of AstraX'20.

There was noticeable participation of students from various colleges across India, including IIT Gandhinagar, IISER Bhopal, IISER Mohali, UIET Punjab University, and various other colleges.

Marking the commencement of the meet, the opening ceremony was held on the evening of 13th March. Former Director Prof. Timothy A. Gonsalves welcomed the participants and the keynotes on behalf of IIT Mandi. He also talked about the developments in space technology and the growth of the club.

Introduction to AstraX '20: To share the excitement of this coming Event with all the students of our college, a session was conducted by Shikha, Convenor for AstraX'20 and other members of the organizing team. This session was conducted twice, once in each of the campuses. Description for all the Keynote Speakers and Events to be conducted. We have motivated the students to attend the events and Guest lectures too.

North Campus:
Venue: A10-1C
Date: 18 February 2020
Time: 7 PM

South Campus:
Venue: A5
Date: 20 February 2020
Time: 9 PM

Keynotes: Listed below are the brilliant keynotes of AstraX'20 and the titles of their talks.

Prof. Avinash Deshpande - Professor at Raman Research Institute, India. He specialises in Neutron stars, Pulsars & Transients, The Galaxy and Interstellar medium, Instrumentation and Signal processing. He also runs the famous SWAN project.

Mr. Sanjay Gupta - He is a founder-member of the Aryabhat Foundation, actively involved with students for more than 3 decades. He was designated as Master Resource Person by Dept. of Science and Technology, GOI in 1995. Was a member of NASA's Saturn Observation Campaign for 9 years.

Dr. Nicholas Murphy (Remote) - Astrophysicist in the Solar & Stellar X-Ray Group at the Smithsonian Astrophysical Observatory (SAO) and a Lecturer in Harvard University's Department of Astronomy. A Lead Developer of the PlasmaPy Project and affiliated to Harvard-Smithsonian Center for Astrophysics.

Dr. Stuart Mumford (Remote) - A Lead Developer of The SunPy Project and a Python Developer at Daniel K. Inouye Solar Telescope Data Centre, National Solar Observatory, United States.

Events: Three online and four onsite events were conducted in AstraX'20.

Shooting Star (online): Shooting star was the online astrophotography event of Astrax'20. The contest was open for a month and participants could submit at most two entries which were posted on STAC's social media pages. The entries were judged on the technical aspects of photography as well as their popularity on social media. The technical aspects of the photographs were judged by Mr. Alok Mandavgane from Aryabhat Foundation. Amit Kumar Baheti from IIT BHU and Vivek Reddy from Osmania University secured the First and Second place respectively.

Estrella (online): This was an online essay/blog writing event in which participants had to submit their essays on the theme of Stars, Solar Physics and Radiophysics, to help provide participants an opportunity to express and explore their views on the theme. The event was judged by Bhavya Bhatt and coordinated by Harnaman Kaur and Yash Bansod. The top three submissions were from Tushika Singh (IIT Mandi), Prajwal Sood (IIT Mandi), and Jainan Tandel (IIT Mandi)

Gordian Knot (online): This event dealt with concepts of astronomy, astrophysics, cosmology and related areas. It was conducted online on the dare2compete platform. 41 students from various colleges registered for the event. There was a round that had 28 questions of various difficulties. Devang (IISER Mohali) and Dhruv Pathak (IISER Mohali) stood at first and second position respectively.

Enigma (onsite): This was a five-hour hackathon that was conducted in two rounds. In the first round, participants were provided with the detailed problem statement and the required database. In the second round, the qualifying teams went through a question-answer round with the judges. The event was coordinated by Lalit Mudgal and Prajwal Sood and was judged by Dr. Aditya Nigam and Dr. Satyajit Thakor. Teams from IISER Mohali and IIT Mandi secured the first and second place respectively.

Mission CanXat (onsite): Mission CanXat was the space-tech oriented event of AstraX wherein the participants were asked to present a working model of a Can-Sat in the form of a presentation. It was later amalgamated with the open-paper presentation event. The participants were judged based on their conceptual understanding of their topic and its presentation, as well as on the clarity and depth to which they were able to communicate the same. Punjab University stood first and IIT Mandi stood second in this event. The event was judged by Prof. Narsa Reddy.

Messier Marathon (onsite): Messier marathon as the name suggests was a marathon to point messier objects. The participating teams had to point maximum messier objects with a telescope within the allotted time. Four teams participated in the event. The event was coordinated by Shreya

Lanjewar and Janhavi Shedge. The event was judged by Mr. Vikrant Narang from Space India. IISER Bhopal bagged the first place in this event.

Celesta (onsite): Celesta was an all night astrophotography competition. The participation was good and the participants clicked the pictures of various astronomically significant objects. The submissions were judged based on the concept, composition, post-processing, technical excellence and the overall creativity cum uniqueness of the picture. The submissions were judged by Chitransh Saxena and Kartiki Gonsalves. The winning team was Pranjal Chaturvedi and Kapish Mittal from UIET, Punjab university

Solar Astronomy Workshop: The Aryabhat foundation conducted a Solar Astronomy Workshop in the IIT Mandi campus for the participants of AstraX'20. The workshop included an one hour theory session which provided insights on the basic concepts of Solar Astronomy. This was followed by a hands-on session which was supervised by Aakash, a student from the Aryabhat Foundation. In this hands-on session, Aakash set up a telescope near the Village Square and demonstrated how Solar Astronomy is practiced. He also told the participants about what things to keep in mind while inspecting the various aspects of the sun through a telescope.

Outreach Program: This year in AstraX, two workshops were organised for local school students of IIT Mandi as a part of our outreach program.

Introductory Python Workshop: The Python Software Foundation (PSF) organized a Python workshop for high school students under the banner of AstraX'20. The workshop was aimed at introducing the importance of python language and astronomy using python. This workshop also concentrated on various other topics like open source and closed source development in Python, its uses in places other than astronomy, and so much more.

Bhavya Bhatt, Tanmay Rustagi, Rishi Sharma and Abhijeet Manhas were the mentors from IIT Mandi who conducted the sessions on various topics. These mentors are members of the PSF. They were also featured in the local newspaper for organizing this session.

मंडी कालेज में आईआईटी के छात्रों की कार्यशाला

मंडी, 14 मार्च (ब्यूरो)। वल्लभ राजकीय महाविद्यालय में पाइथन उच्च स्तरीय प्रोग्रामिंग पर एक दिवसीय कार्यशाला का आयोजन प्रो. निशा वैद्य और याचना शर्मा की अध्यक्षता में आईआईटी मंडी कमांड के छात्रों के साथ मिल कर किया गया। इस कार्यशाला में भौतिकी विभाग के विद्यार्थियों ने भाग लिया।

निशा वैद्य व याचना शर्मा ने बताया कि इस कार्यशाला में पाइथन के बारे में विद्यार्थियों ने सीखा कि यह एक ओरिएंटड और हाई लेवल प्रोग्रामिंग भाषा है। पाइथन प्रोग्रामिंग से आप बेवसाइट, गेम और गूगल जैसा सर्च इंजन भी बना सकते हैं।

कार्यशाला में प्रतिभागी जानकारी हासिल करते हुए।

प्रोनिशा ने बताया कि इस भाषा का इस तरह से डिजाइन किया गया कि इसमें लिखे गए कोड आसानी से पढ़ और समझे जा सकें।

Workshop by Aryabhat Foundation: As a part of Corporate Social Responsibility, AstraX'20 also organized a Basic Astronomy Workshop in collaboration with Aryabhat Foundation for middle school students of nearby schools. We organized film shows and solar astronomy workshops which aimed to promote astronomy education in these students and thus develop an interest in astronomy and astrophysics among them, on a basic level. More than 100 students from different schools of Mandi attended the workshop.

Talk on Hypersonic Vehicles: We also conducted a talk on "Introduction to Hypersonic Vehicles" which was handled by Pon Maa Kishan from Chandigarh University who is also the ISRO outreach coordinator and Aishwarya Dhara who is an Aerospace Engineering Professor. The lecture dealt with concepts of Aerospace Engineering and hypersonic vehicles such as RV-W, RV-NW, CAV etc. Students were informed about various aspects of these hypersonic vehicles in detail and how the physical attributes of the atmosphere affect the aircraft vehicle.

NIRMAAN CLUB, IIT MANDI

SRIJAN'20

LARGEST CIVIL ENGINEERING FEST OF THE HIMALAYAS
21ST TO 23RD FEBRUARY 2020

SRIJAN'20

About the fest

Participants of the workshop for SRIJAN'20

TRAINING FOR BENTLEY STAAD.PRO

SPEAKER:

ER. ANISURYA GHOSH

PRACTICAL ASPECTS OF STRUCTURAL ENGINEERING

SPEAKER:

ER. SUNEEL VODITEL

Technical Director
(Technico Structures Pvt. Ltd.)

Dr. Suneel Voditel addressing the participants during SRIJAN'20

Participants of the workshop for SRIJAN'20

AAKARSHAN 2019
(Cultural Society)

Aakarshan is the annual cultural society event in which all the cultural clubs of the college introduce themselves to the freshers through live performances. It is an integral part of the induction of freshers.

Audience: The event was intended for all the freshers of the college, held on 25th August, 2019. Generally it's organised for B.Tech 1st yearites but this year, it was planned for PG freshers as well. All the cultural club members were present for their performances. The event saw an audience size of over 500! This is the maximum audience ever for Aakarshan since its inception.

Cultural Programme

Event	Duration
Open Mic	5 min
Designing Club - Editing Show	5 min
Art Geeks - Art Presentation	15 min
PMC - Photography Technique display and fresher intro video release	20 min
Drama Club - Play (Mime)	20 min
Music Club - Band performance	35 min
Dance Club - Group Dance	10 min




10.3 National Service Scheme (NSS)

National Service Scheme (NSS)- IIT Mandi is a voluntary group of students working for the betterment of the community around them and currently (FY 2019-2020) 150 volunteers are working for the betterment of society and have organized 40 events over the year. They are the social workers of the institute striving for an improved society around them. The motto of NSS is "NOT ME BUT YOU". This reflects the essence of democratic living and upholds the need for selfless service. The overall objective of this scheme is Education and service to the community by the community.

NSS-IIT Mandi has taken up three areas of societal needs where volunteers render their service:- Literacy Section, Awareness Section & Health Section.

PRAYAS TEACHING PROGRAMME FOR GOVERNMENT SCHOOL STUDENTS PRAYAS Program aims to enhance the quality of education provided to the local Himachal youth of the nearby government schools. In this program, the volunteers of NSS-IIT Mandi seek to identify opportunities through which they can play a supportive role to the school teachers and administration, and help to motivate the local young boys and girls to aim for excellence. The PRAYAS program was initiated in November 2013 with 30 girl students of Government Girls Senior Secondary School Mandi. Given that the program is in the 7th year of its operation, it suggests that volunteers are devoted to cater the needs of local students who require guidance and support.

MIGRANT WORKER'S CHILDREN BRIDGE SCHOOL PROGRAMME As our campus is new and under construction phase, a significant number of migrant workers from states like U.P., W. Bengal, Jharkhand, and M.P. live here. The aim of the Bridge School program is to provide basic education to workers' children, who have become infrequent to formal education.The programme was started in 29th May, 2015 and continued its 4th year since then. During fiscal 2019-20, a total of 2 children from the South Campus and 5 children from North Campus of IIT Mandi were admitted to the nearby Government Primary School in Kamand. Till date more than 80 migrant worker's children have been admitted in nearby government schools.

BLOOD DONATION CAMP Blood donation is one of the most significant contributions that a person can make towards the society. Around 135 units of blood were collected in FY 2019-2020 over 4 blood donation camps.

PLANTATION CAMP National Service Scheme unit IIT Mandi organized Tree Plantation Camps over the year and planted close to 900 saplings at various locations, like-IIT Mandi north campus, Katindhi and Suhada.

CLEANLINESS DRIVE 'Swachh Bharat Abhiyan' (Clean Indian Mission) is a national level campaign by the Government of India. NSS-IIT Mandi organized cleanliness drive under 5 Week Induction Programme with newly joined 250 B. Tech. students at Mandi town. Further cleanliness drives continued to Saryolsar and different places of Mandi town. Different competitions were organized in different government schools on the occasion of Swachtta Hi Seva.

SPARK-LIBRARY SETUP PROGRAMM The program aims to setup a library in nearby Government Schools and in the year 2019-2020 NSS unit IIT Mandi organized a donation drive and distributed a set of GK and books related to their subject for 15 school's library.

WORKSHOP ON SOLAR LAMP A workshop on uses of solar energy under renewable energy movement of India was organized by NSS unit IIT Mandi and the school students of GSSS Nishu or GHS Nalan actively participated (60 participants) in the workshop. The lamp was rewarded to the participants after assembling the lamp.

OUTREACH ACTIVITIES: NSS unit IIT Mandi coordinated school visits of 21 different schools of HP and more than 1200 students visited in different labs like; AMRC. TAM, SEM, Mechnaical lab, Chemistry lab, Physics lab, Language lab, Designlab, TF lab, MC lab, Survey lab, DAE lab, BIOX lab and Control system & Robotics Lab etc. at IIT Mandi.

AWARDS

- In 2019-2020 NSS unit IIT Mandi felicitated for its tireless contribution to keep Mandi town clean by Mrs. Sarveen Choudhary, Minister of Urban Development, Government of Himachal Pradesh on the occasion of Gandhi jayanti.
- NSS unit at IIT Mandi was felicitated by Dr. Jiwanand Chauhan, Chief Medical Officer, Neta Ji Subhash Chander Bose Zonal Hospital Mandi, Himachal Pradesh. On National Voluntary Blood Donation Day-2019 for highest donations of blood in Financial Year 2018-2019.

DONATIONS

Old Age Home Sundernaggar, July-2018 - donated eatables of Rs. 5000.00.
Divya Manav Jyoti Anathalaya, August, 2019 - donated eatables of Rs. 5000.00.
National Blind Association Kullu, August-2018 - donated Cash of Rs. 2500.00.
SAHYOG: Special Kids Home Nagchala, August-2018 - donated stationary and eatables of Rs. 6000.00.
Divya Manav Jyoti Anathalaya, October, 2019 - donated eatables of Rs. 4000.00.
Old Age Home Sundernaggar, August-2018 - donated Fruits of Rs. 1500.00.
Leprosy Patients Mandi, November-2018 - donated Grocery items of Rs. 10500.00.
Nearby Government Schools, 2019-2020 - Rs. 1,01,793.00 donation was collected and provided 15 sets of books for school library and 3 water dispenser provided for the GSSS Nishoo, Kamand and Katoula.

NSS unit IIT Mandi felicitated for its tireless contribution to keep Mandi town clean at Seri Stage, Mandi

NSS unit IIT Mandi felicitated for highest donation of blood for the FY 2018-2019 at Zonal Hospital Mandi

NSS unit IIT Mandi organized cleanliness drive at Mandi town.

NSS unit IIT Mandi donated 15 sets of books in different schools, Principal GSSS Baggi

NSS unit IIT Mandi donated 3 water dispensers for nearby schools, Principal and students of GSSS Katoula

10.4 Guidance and Counseling Service (GCS)

Activities by the Guidance and Counseling Service during the year 2019-20 are broadly categorized in to sections below.

1. **Five Week Induction Program (5WIP)**

   A five week induction program was conducted for the incoming batch of B.Tech students from 26th July 2019 onwards. More than 80 faculty members were involved in the 5WIP. Responsibilities of GCS include, pre arrival counseling and admission guidance on arrival, organization of the orientation program, over all coordination of activities, preparation of timetable, carrying out informal activities and distinguished lectures.

2. **Orientation Programs**

a. **B.Tech., PG and Ph.D students:** Orientation program was organized for the incoming UG, PG and Ph.D students to introduce them to the academics, research and student life at IIT Mandi. For UG students program was organized on 25th July, 2019.

b. **'WPI students:** In the year 2019, an orientation program was organized for the visiting WPI students. The program included a introductory session with talks, and walk around the campus.

10.5 Career And Placement Cell

Career and Placement Cell organized the following career sessions

1. **Career session on the recipe for landing a high-paying job in data science on 10th August 2019** This was a technical talk cum interactive session with Mr. Viswanath Reddy.

   Speaker: Mr. Viswanath Reddy. He has 13 years of experience in the field of Data Science, Machine learning, and Artificial intelligence. He has worked in the USA, Middle East, South East Asia, and India. He currently heads the Analytics division at Tredence, and also actively oversees recruitment. He recently received the "40 under 40 Data scientist" award.

2. **Workshop on resume making conducted on 17th August 2019** This workshop mainly focused on the basic structure of preparing a one-page resume. The workshop also answered doubts about what exactly will different companies in different fields look for in a resume. Speaker: Mr. Varun Gupta, IIT Kanpur alumni, IIM Ahmedabad alumni, currently working at Accenture as Strategy Analyst.

3. **Online Placement Preparation by Bullseye from 17th August 2019 onwards for Final and Prefinal year registered students.**

4. **Exploring non-core job opportunities on 24th August 2019** In this session, Mr. Vivek explained what it means/implies to work in non-core and how to develop skills for the same and also answered the queries from the students.

   Speaker: Mr. Vivek Sharma, associate product manager at Gaana.com. He graduated from IIT Mandi in 2017 with B.Tech in Electrical Engineering along with a minor in Management studies. He was awarded the Director's Gold Medal for all-around excellence in academics and extra-curricular activities among the graduating batch.

5. **Mock interviews by Prepleaf from 25th August 2019 onwards for final year students.**

6. **Career talk about leadership on 17th September 2019** In this technical talk cum interactive session helped the students to impart and develop lifelong social skills and even hidden talents beyond the lecture halls.

   Speaker: Mr. Dinesh serves as Global Head of Mergers and Acquisitions within LTI. His professional career spans over 20 years working for companies like Accenture, IBM, Fidelity Investments across markets like India, Japan, US, UK and Singapore. Besides M&A, he is a start-up evangelist and has a very strong connection in start-up eco-system across India, Israel and Silicon Valley. He mentors start-ups and does angel investments in his personal capacity.

7. **Career guidance seminar on 4th October 2019** The key takeaways of the session were Knowledge & credentials needed for different sectors of the job, how to approach companies which are not coming in campus, discussion about different career opportunities and also about 1-year fellowship programs designed for graduate students for different skill development.

   Speaker: Akshat Srivastava, MBA From IIM Calcutta in 2016-18, Integrated Masters from IIT Kanpur in Mathematics & Scientific Computing in 2010-15, Professional working experience in

Mckinsey & Co., Auctus Advisors and American Express. Currently working as a Consultant at the Boston Consulting group.

8. **Technical Talk by Srinivas Chamarthy on 9th October 2019** In this technical talk he discussed on topics like innovation, technology, and Development and also shared his experience. Speaker: Srinivas Chamarthy, Chief Innovation Executive& Managing Director of Cyme Automation Systems Private Limited.
9. **Workshop by Indeed on 16th November 2020**

   Speakers: Officials from Indeed. Indeed, an American worldwide employment-related search engine for job listings, is organized a 1.5 hr workshop for Computer Science and Electrical Engineering students.
10. **Interactive session with Mr. Siddharth Gangal (CEO, The Solar Labs) on 23rd February 2020** Talk and discussion about startups, funding, problems, and solutions, etc.

    Brief about the speaker and The Solar Labs: In 2016, Mr. Siddharth with some IIT Mandi graduates founded 'The Solar Labs'. He is a graduate in Electrical Engineering from IIT Mandi and is presently CEO at The Solar Labs. The Solar Lab has the vision to improve solar power with the help of software & AI.
11. **Webinar on Demystifying Data Science on 18th February 2020**

    Speaker: Mr.Venkatesh CG, head data Science corp LTI, Former speaker IIT Bombay, E-Summit 2020.
12. **Interactive session with Mr. Athar Aamir Khan (IAS Officer) on 24th February 2020**

    Speaker: Mr. Athar Aamir Khan cracked the Civil Services Examination (UPSC) in 2016 with 2nd rank. He is a graduate in Electrical Engineering from IIT Mandi and is currently posted in Rajasthan.
13. **Career Motivation session for MA-Development Studies on 6th March 2020**

    Speakers: Dr. Devika, Dr. Shyamasree and Dr. Sunny Zafar
14. **Opportunities after Graduating in Engineering Physics on 13th March 2020**

    Speakers: Dr. Pradeep Kumar and Dr. Sunny Zafar

10.6 Women Cell

IIT Outreach Program and Participation of Women Education Program

Faculties from IIT Mnadi actively participate in to various educational initiative take by district administration. For examples, recently on 28th February,2020 District Institute Of Education Training (Ssa & Rmsa Mandi) arranged a workshop which involved the participation of 70 women teachers from entire district on the occasion of “Women In Science”. In this program two female faculties from IIT Mandi-Dr Aditi Halder and Dr Tulika Srivastava spoke about the importance of women in science and about the teaching method.

International Women’s Day had been first time celebrated by the United Nations in the year 1975. International Women’s Day is celebrated for the continuous effort and struggle we put forward to achieve gender equality and women's empowerment. On this occasion, women’s center at IIT

Mandi had organized an event on 10th March. The program included a few interesting stories of women empowerment by Ms Sandhya Menon, project manager, EWOK. The guest of honour was Dr Priscilla Gonslaves. The program included the videos of women empowerment, presentation and cultural events. There was also be a panel discussion on “women in leadership and policy making” which included both faculties and students.

वैज्ञानिक दृष्टिकोण से बनाई जाए साइंस प्रोजेक्ट रिपोर्ट

मंडी में 70 स्कूलों की विज्ञान अध्यापिकाओं ने किया मंथन, 'विज्ञान में महिलाएं' विषय पर दी बेहतरीन प्रस्तुतियां

प्लास्टिक कचरे का बनाया निदान

11. MEDIA COVERAGE

Media Outreach-2019-2020

In the year 2019-2020, there were approximately 255 print coverage, 497 online coverage and 4 electronic coverage for IIT-Mandi. Publications that have Covered IIT Mandi the Most include Hindustan Times, The Statesman, The Pioneer, Telangana Today, The Times of India – Education Time, The Economic Times, Deccan Herald, The Hans India, Dainik Jagran, The Tribune,Hindustan,The Hindu Business Line, The Financial Express, Mint, Education World, Western Times, Morning India and many more. One national media visit to campus also happened which involved the visit of Mr. Vishwam Sankaran from Press Trust of India on 5th - 7th December, 2019 on 4th International and 19th National Conference on Machines and Mechanisms - iNaCoMM 2019.

Major Highlights

IIT-Mandi (2010-2020):10 years in Kamand

Indian Institute of Technology Mandi began its journey in 2009 and has since progressed rapidly with many firsts and pioneering initiatives in engineering education, Research and Development (R&D), societal impact and international collaborations.

Prof. Timothy Gonsalves, Director of IIT Mandi since its inception, addressed a Press Conference on campus today, 12th February 2020. Prof. Gonsalves highlighted the successes and achievements of the Institute.

Addressing the media's query on "How did IIT Mandi rise to the top position in Himachal overall (NIRF) in the short span of less than 10 years?" , Prof. Timothy A. Gonsalves, Director - IIT Mandisaid,"In 2010, IIT Mandi adopted a strategy of working on research directed towards solving major challenges of the Himalayan Region and of India. We crafted a unique project-based learning approach and a collaborative inter-disciplinary culture. These factors enabled our exceptionally talented and dedicated faculty and students to crack challenging societal and academic problems."

IIT Mandi targets completing infrastructure for 2500 students by 2021

With a target of completing 2.16 lakh sq. mt of construction by 2021, the campus infrastructure will have the capacity to host 2,580 students, which will accommodate future growth of the Institute as its current strength is close to 1,300.

Having started its journey in 2009 with 510 acres of grassland on the banks of river Uhl in the village Kamand of Himachal Pradesh, 460 kms away from New Delhi, the Indian Institute of Technology Mandi has made impressive and rapid strides towards creating a remarkable and unique campus in the challenging yet serene Himalayan setup.

The Institute now has a state-of-the-art infrastructure with a built-up area of 1.15 lakh sq.mt comprising of housing for 1,300 students, 112 faculty and 61 staff members, cutting-edge laboratories, libraries, sports facilities, spaces for other extra and co-curricular activities. This includes a 750-seater auditorium which is one-of-its-kind in the region and has already started hosting events attracting experts from all over the world. The unique design of the hostels with

large common spaces and terraces is an added perk for the students. The Institute is on track towards completing 2.16 lakh sq.mt of construction by the year 2021 to provide for 2,580 students and 270 faculty and staff members.

Highlighting the state-of-the-art infrastructure on campus, Prof. S. C. Jain, Dean (Infrastructure and Services), IIT Mandi said, "We are on our way towards creating one of the most beautiful campuses in the country. The rivers, mountains and the warmth of people, tempered with the best of residential, academic, and institutional infrastructure, has set IIT Mandi on its path towards emerging as a place of attraction for the best minds across the world."

Technology - Enhanced Services

The Construction and Maintenance Wing of IIT Mandi uses a web-based project management tool developed in-house by students with an open source platform to monitor the progress of construction. It also uses an online Ticketing System to manage maintenance services.

The Institute has established an advanced IT infrastructure including high-speed links of 1 GBPS capacity based on an optical backbone and more than 200 Wi-Fi access points. The Institute has also established a High-Performance Computing Cluster with 160 nodes based on 3000 cores (CPU+GPU) and this continues to grow steadily.

IIT Mandi Researchers Predict a Weakening Strength of Indian Summer Monsoon

IIT Mandi Researchers led by Dr. Sarita Azad predicted a Weakening Strength of Indian Summer Monsoon. They developed an algorithm will process 100 years of data of the Indian Summer Monsoon Rainfall and factor in Global Climate Phenomena such as El Nino Southern Oscillation. It will also factor in information about global climate phenomena such as El Nino Southern Oscillation (ENSO) and can access periodicity of switching between strong and weak monsoon years. Their work has recently been published in the reputed American Geophysical Union (AGU) peer-review International journal Earth and Space Science. This work received a major highlight and excellent press covrage.

IIT Mandi Researchers Developing Thermoelectric Materials for Efficient Conversion of Heat into Electricity

A research team led by Dr. Ajay Soni, Associate Professor (Physics), School of Basic Sciences, IIT Mandi, is studying materials that can convert heat into electricity. The team has been prolific in its research on thermoelectric materials and many of its papers have been published in reputed peer-review international journals including Applied Physics Letters, Physical Review B, Journal of Alloys and Compounds, ACS Applied Energy Materials and RSC Journal of Materials Chemistry and Energy Environmental Sciences.

IIT Mandi researchers develop new algorithms that can diagnose failure in components of climate control systems used in buildings

Indian Institute of Technology Mandi researchers of Modeling and Intelligent Control group have developed new algorithms for component failure detection and diagnosis that can enhance the energy-efficient operation of Heating, Ventilation and Air Conditioning (HVAC) systems used in buildings. The results of the team's recent work have been published in the Journal of Building Engineering, Elsevier. The research paper has been done under the direction of Dr. Tushar Jain, Assistant Professor, School of Computing and Electrical Engineering, IIT Mandi, and co-authored

by his research scholar, Mr. Mona Subramaniam A., and Dr. Joseph Yamé from Universitè de Lorraine, France.

IIT Mandi researchers find way to incorporate turmeric-derived curcumin into drug nanoformulations

Researchers from Indian Institute of Technology Mandi and Indian Association for the Cultivation of Science, Kolkata, have developed a new route by which curcumin, the medicinal chemical present in turmeric, can be incorporated into drug nanoformulations. Their work has recently been published in an international journal, Crystal Growth & Design. It is a peer-reviewed scientific journal published by the American Chemical Society. The research team consists of Dr. Prem Felix Siril, Principal Investigator of the research and Associate Professor, School of Basic Sciences, IIT Mandi, and his research scholar Ms. Kajal Sharma, along with Dr. Bidisha Das from the Indian Association for the Cultivation of Science, Kolkata.

IIT Mandi researchers aid the development of portable device to screen for Cervical Cancer

Indian Institute of Technology Mandi Researchers have contributed in developing an Artificial Intelligence-powered point-of-care device to screen for cervical cancer by analysing microscopy images with high accuracy. This project has been taken up in collaboration with Aindra Systems Pvt. Ltd., Bengaluru.The research was undertaken by a team led by Dr. Anil Sao and Dr. Arnav Bhavsar, Associate Professors, School of Computing and Electrical Engineering, IIT Mandi with their research scholars Ms. SrishtiGautam and Ms. Krati Gupta. The team, along with the industry collaborators, has developed AI-based algorithms that enables the device to undertake automatic screening for cervical cancer.

IIT Mandi researchers develop a novel Photocatalyst that can efficiently use sunlight to split water for Hydrogen production

Indian Institute of Technology Mandi researchers have developed new materials that can use sunlight for the production of hydrogen from water. The project has been taken up in collaboration with researchers from Yogi Vemana University, Andhra Pradesh.The research was undertaken by a team lead by Dr. Venkata Krishnan, Associate Professor, School of Basic Sciences, IIT Mandi with his research scholars Dr. Suneel Kumar, Mr. Ajay Kumar, and Mr. Ashish Kumar along with Dr. M. V. Shankar and Mr. V. N. Rao of Yogi Vemana University, Andhra Pradesh. Promising results of their recent study has been published in American Chemical Society (ACS) Applied Energy Materials journal.

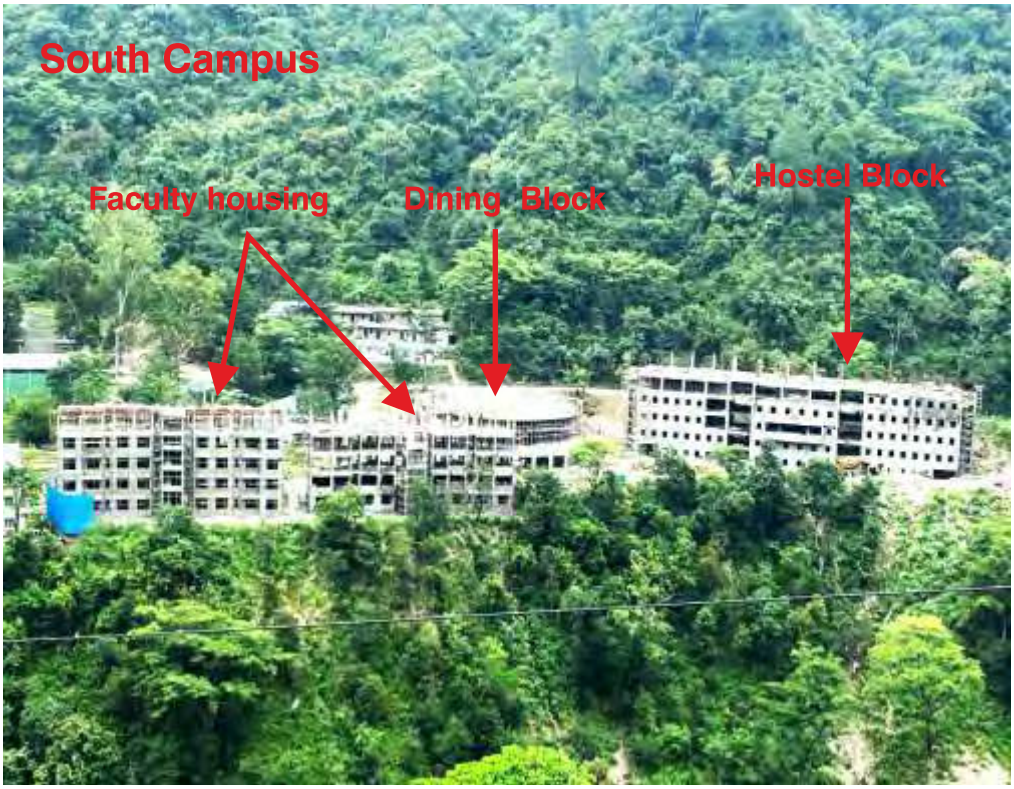
12. CONSTRUCTION ACTIVITES

Our Campus at Kamand

The construction work of IIT Mandi started in the year 2012. Presently both the campuses ie. North and South Campus are fully functional.

South Campus presently is housing 763 students beside 52 faculty and having sports facilities like Cricket field, Football Field, Lawn Tennis Court, Basketball Court, Volleyball Court and Sports Complex having yoga room, Badminton Hall, T.T. hall etc.

500 students hostel, Dining block cum Student activity Centre, 45 3BHK, 5 2BHK flats are presently under construction and are likely to be complete by Dec. 2020 to March, 2021.

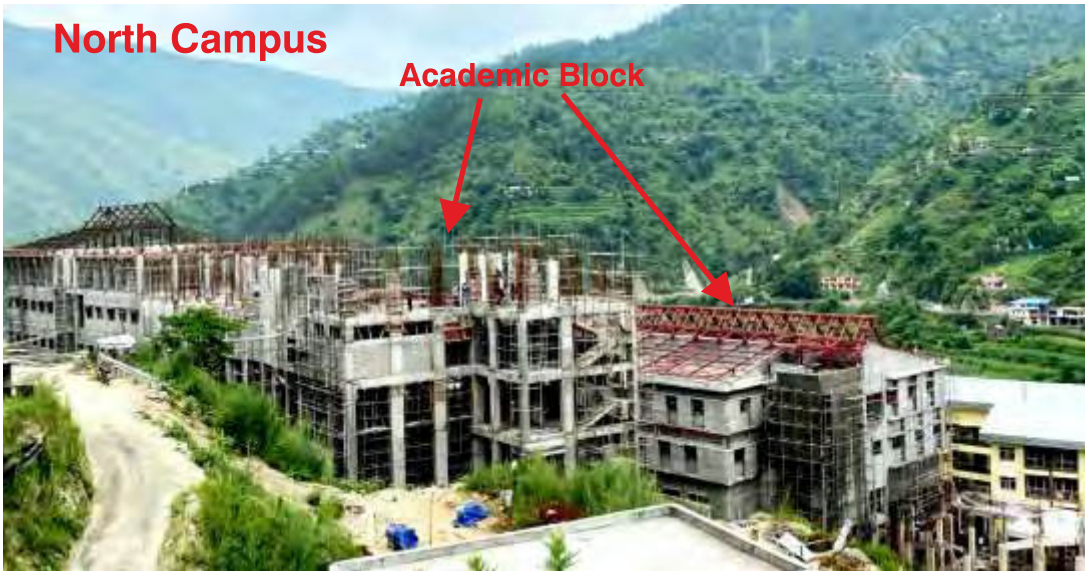


Gharpa at South Campus

In the North Campus presently 1000 students are residing along with 67 faculty having facilities 88 room Guest House, Compus School, Guest House, 800 seater capacity Auditorium, Sports Complex having Badminton Court, Gym, Swimming pool, TT room etc.

Hockey ground, two nos. Tennis Court, Volleyball Court and Basketball Court and under construction and likely to be completed by Dec. 2020 to March, 2021. Beside this two nos. hostel and 12 No. faculty housing are also likey to be completed by Dec. 2020 to March, 2021.

Academic Block are also under construction which are also likely to be completed by Dec. 2020 to March, 2021.



13. BOARD OF GOVERNORS

Chairperson
Shri Subodh Bhargava
Former Chairman, TATA Communications Limited
Villa 69, the Palm Springs
Golf Course Road, Sector – 54
Gurgaon – 122 002, Haryana

Members

Prof. Timothy A Gonsalves
Director, IIT Mandi (Ex-officio)
Indian Institute of Technology Mandi
Mandi – 175 075 (H.P.)

The Chief Secretary/ Secretary (TE)
(Ex-officio)
Government of Himachal Pradesh
Shimla – 171 002

The Principal Secretary/Secretary (TE)
(Ex-officio) till 24.03.2020
Government of Jammu & Kashmir
Jammu & Kashmir – 180 001

The Additional Secretary (TE)/ Joint Secretary(Ex-officio)
MoE, Government of India
Shastri Bhawan,
New Delhi- 110 001

Shri Kishan Chandra Sharma
Site Head & Sr. Vice President
Manufacturing, LUPIN Pharma Limited
198 - 202, New Industrial Area No. 2
Mandideep – 642 046, Distt, Raisen
(M.P.)

Shri Hemant Sood
Managing Director & Promoter
(Financial Services group)
Findoc Financial Services Group
5th Flr, Kartar Bhawan, Near PAU, Gate No.1, Ferozpur Road, Ludhiana-141 001 (Punjab)

Dr. Pradeep Kumar Agrawal
Scientist, Directorate of Special Projects
D.R.D.O. Hyderabad
H.No. 16-142, Green Rich Avenue
Badangpet Nagar Panchyat
Hyderabad- 500 058

Prof. S. C. Jain
Dean (I & S) & Emeritus Professor
School of Engineering
Indian Institute of Technology Mandi
Mandi – 175 075 (H.P.)

Dr. Subrata Ghosh
Associate Professor
School of Basic Sciences
Indian Institute of Technology Mandi
Mandi – 175 075 (H.P.)

Secretary
Shri K. K. Bajre
Registrar (Ex-officio)
Indian Institute of Technology Mandi
Mandi – 175 075 (H.P.)

**During this year meetings of the Board of Governor were held on 08.04.2019, 15.06.2019, 30.08.2019, 05.10.2019 and 13.12.2019.*

14. Finance Committee

Chairperson (Ex-officio)
Shri Subodh Bhargava
Former Chairman, TATA
Communications Limited
Villa 69, the Palm Springs
Golf Course Road, Sector – 54
Gurgaon – 122002, Haryana

Members

Prof. Timothy A Gonsalves
Director, IIT Mandi (Ex-officio)
Indian Institute of Technology Mandi
Mandi – 175 075, (H.P.)

The Addl. Secretary/Bureau Head (T.E.)
(Ex-officio)
MoE, Government of India
Shastri Bhawan,
New Delhi-110 001

The Joint Secretary & Finance Advisor
(Ex-officio)
MoE, Government of India
Shastri Bhawan,
New Delhi – 110 001

Prof. Ashok Gupta
Professor
Department of Civil Engineering
IIT Delhi, Hauz Khas
New Delhi – 110 016

Prof. P. Sriram
Registrar I/c, Dean (Admin) & Head
Dept. of Aerospace Engineering
Indian Institute of Technology Madras
Chennai - 600 036

Dr. Vishal Singh Chauhan
Dean (F & A) (Ex-officio)
Indian Institute of Technology Mandi
Kamand – 175 075,(H.P.)

Secretary
Shri K. K. Bajre
Registrar (Ex-officio)
Indian Institute of Technology Mandi
Kamand – 175 075, (H.P.)

**During this year meetings of the Finance Committee were held on 08.04.2019, 15.06.2019, 30.08.2019, 05.10.2019 and 13.12.2019.*

15. Building & Works Committee

Chairman (Ex-officio)
Prof. Timothy A. Gonsalves
Director
Indian Institute of Technology Mandi
Kamand – 175 075, (H.P.)

Dean (I&S) (Ex-officio)
Indian Institute of Technology Mandi
Kamand – 175005, Himachal Pradesh

Member

Prof. B. Bhattacharjee
Professor
Department of Civil Engineering
Indian Institute of Technology Delhi
Hauz Khas, New Delhi - 110 016

Er. A.K. Jain
Senior Consultant, IIT Mandi &
Special DG, CPWD (retired)
Mandi – 175 075, Himachal Pradesh

Er. Niranjan Singh
Chief Engineer (Civil), CPWD (retired)
A-3/202, Nirmal Chhaya Towers
V.I.P Road, Zirakpur
Distt. SAS Nagar, Mohali (PB)- 140 603

Member Secretary
Er. Sunil Kapoor
Superintending Engineer (Ex-officio)
Indian Institute of Technology Mandi
Kamand Campus, VPO Kamand
Distt. Mandi – 175 075, (H. P)

**During this year meeting of the B & W Committee was held on 21.08.2019.*

16. Senate

Chairman

Prof. T. A. Gonsalves, Director, IIT Mandi (Ex- officio)

Institute Members

Prof. B. D. Chaudhary, Dean (Faculty)

Prof. S. C. Jain, Dean (I&S)

Dr. Pradeep Parameswaran, Dean (Academics)

Dr. Prem F. Siril (upto 03.09.2019)/Dr. Venkata Krishnan (from 04.09.2019), Dean (SRIC&IR)

Dr. Suman K. Pal (upto 08.09.2019)/ Dr. Manoj Thakur (from 09.09.2019), Dean (Students)

Dr. Vishal Singh Chauhan, Dean (F & A) and Associate Dean (F & A)

Dr. Bharat Singh Rajpurohit, Chairperson, SCEE

Dr. Viswanath Balakrishnan, Chairperson, SE

Dr. Syed Abbas, Chairperson, SBS

Dr. Rajeshwari Dutt (upto 06.03.2020)/ Dr. Suman (from 07.03.2020), Chairperson, SHSS

Prof. Ramesh Oruganti, Adjunct Professor, SCEE

Prof. Kenneth E. Gonsalves, Distinguished Visiting Professor, SBS

Prof. Subrata Ray, Distinguished Visiting Professor, SE

Dr. Rik Rani Koner, Coordinator, AMRC & Assistant Professor

Dr. Tulika P. Srivastava, Associate Dean (Faculty) and Co-ordinator, BioX

Dr. A. K. Sao, Associate Dean (Course) and Coordinator CIG-M.Tech. Comm. & Signal Process.,

Dr. Varun Dutt, Associate Dean (International Relations)

Dr. Samar Agnihotri, Associate Dean (SRIC)

Dr. Kunal Ghosh, Chair CPC

Dr. Astrid Kiehn, Chair, Library Advisory Committee (LAC)

Dr. Arpan Gupta, CIG- ME

Dr. Deepak Swami, CIG- CE

Dr. Shubhjit Roy Chowdhury, Coordinator, CIG-EE

Dr. Kaustav Sarkar, Assistant Professor, SE

Mr. Naresh Singh Bhandari, Deputy Librarian, IIT Mandi (in absence of Librarian)

Dr. Rajendra Kumar Ray, SAP Chair

Dr. C. S. Yadav, Chief Warden

Dr. Dileep A. D., CIG- CSE

Dr. Satinder K. Sharma, Co-ordinator , C4FED

Dr. Rahul Vaish, Associate Dean (Research) & Associate Professor, SE

Dr. Ajay Soni, Coordinator CIG-I-PhD (Physics)

Dr. Aniruddha Chakraborty, Coordinator CIG-M.Sc. (Chemistry)

Dr. Atul Dhar, Coordinator CIG – M.Tech. (Energy Engineering)
Dr. Jaspreet Kaur Randhawa, Coordinator CIG- M.Tech. (Energy Materials)
Dr. Manoj Thakur, Associate Professor, SBS
Dr. Shyam Kumar Masakapalli, Assistant Professor, SBS
Dr. Devika Sethi, Assistant Professor, SHSS
Dr. Suman Sigroha, Assistant Professor, SHSS
Shri K. K. Bajre, Registrar & Secretary, Senate
Student Research Affairs Secretary
Student Academic Affairs Secretary
Student General Secretary

Outside Members

Prof. Sunil R. Kale
Professor
Deptt. of Mechanical Engg., IIT Delhi

Prof. N. Sathyamurthy
Former Director, IISER, Mohali &
Honorary Professor
Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bengaluru

Prof. Rowena Robinson
Professor, SHSS, IIT Bombay

**During this year meetings of the Senate were held on 02.04.2019, 12.04.2019, 27.06.2019, 01.10.2019 and 13.02.2020.*

17. ACADEMIC OFFICIALS AS ON 31.03.2020

DIRECTOR

Prof. Timothy A. Gonsalves
Director

DEANS

Prof. B. D. Chaudhary
Dean (Faculty)

Dr. Suman Kalyan Pal (upto 08.09.2019)
Dean (Students)

Dr. Manoj Thakur (from 09.09.2019)
Dean (Students)

Dr. Pradeep C. Parameswaran
Dean (Academics)

Prof. S.C. Jain
Dean (Infrastructure and Services)

Dr. Vishal Singh Chauhan
Dean (Finance & Accounts)

Dr. Prem Felix Siril (upto 03.09.2019)
Dean (SRIC & IR)

Dr. Venkata Krishnan (from 04.09.2019)
Dean (SRIC & IR)

ASSOCIATE DEANS

Dr. Anil K. Sao
Associate Dean (Courses)

Dr. Vishal Singh Chauhan
Associate Dean (Finance & Accounts)

Dr. Samar Agnihotri
Associate Dean (SRIC)

Dr. Kaustav Sarkar (from 31.05.2019)
Associate Dean (Infrastructure)

Dr. Varun Dutt
Associate Dean (International Relations)

Dr. Rahul Vaish
Associate Dean (Research)

Dr.Tulika P. Srivastava
Associate Dean (Faculty)

CHAIRPERSONS

Dr. Bharat Singh Rajpurohit
School of Computing and Electrical Engineering

Dr. Syed Abbas
School of Basic Sciences

Dr. Suman Sigroha (from 07.02.2020)
School of Humanities and Social Sciences

Dr. Viswanath Balakrishnan
School of Engineering

Dr. Rajeshwari Dutt (upto 06.02.2020)
School of Humanities and Social Sciences

18. Administrative Officials as on 31.03.2020

ADMINISTRATIVE OFFICIALS AS ON 31.03.2020	
Mr. K. K. Bajre, Registrar	**Er. Sunil Kapoor**, Superintending Engineer
Mr. Naresh Singh Bhandari, Deputy Librarian	**Mr. J.R. Sharma**, Consultant (Finance & Accounts Officer)
Mr. C.L. Sharma, Consultant [Dy. Registrar (Audit & Legal)]	**Mr. Suresh Kumar Rohilla**, Assistant Registrar (Stores & Purchase)
Mr. Vivek Tiwari, Assistant Registrar (Academics)	**Mr. Parminder Jit**, Assistant Registrar (SRIC & IR)
Ms.Shelika, Assitant Registrar (Staff Admin. & Recruit.)	**Dr. Chander Singh**, Medical Officer
Dr. Shib Nath Jha, Principal Sports Officer	**Dr. Milan Behl**, Medical Officer (Ayurveda)
Dr. O. P. Mahendru , Medical Officer	**Dr. Neha Sharma**, Medical Officer (Relieved on 16.05.2019)
Dr. Mridu Thakur, Medical Officer (Relieved on 15.09.2019)	**Dr. Nishank Shekhar**, Medical Officer (Specialist) (Relieved on 09.12.2019)
Mr. Amar Singh, Officer On Special Duty (Relieved on 29.02.2020)	**Dr. Parminder Singh Bhatti**, Medical Officer (GDMO) (Relieved on 26.02.2020)

19. LIST OF EMPLOYEES
(Deputation + Permanent + Contract Against Pay Scale)

Sr. No.	Name	Designation
	GROUP 'A'	
1	Mr. K. K. Bajre	Registrar (On Deputation) (From 15.04.2019 to till date)
2	Er. Sunil Kapoor	Superintending Engineer
3	Mr. Naresh Singh Bhandari	Deputy Librarian
4	Mr. Suresh Kumar Rohilla	Assistant Registrar (Stores & Purchase)
5	Mr. Vivek Tiwari	Assistant Registrar (Academics)
6	Mr. Parminder Jit	Assistant Registrar (SRIC & IR)
7	Ms. Shelika	Assistant Registrar (Staff Admin. & Recruit.)
8	Dr. Chander Singh	Medical Officer
	GROUP 'B'	
9	Ms. Monika Kashyap	Senior Superintendent
10	Mr. Anuj Kumar Dubey	Senior Superintendent (Ad-hoc)
11	Mr. Hardeep Singh	Security Officer
12	Ms. Chandan Sharma	Superintendent

13	Mr. Puneet Kumar	Assistant Engineer (Civil)
14	Mr. Siddharth Jamwal	Assistant Engineer (Civil)
15	Mr. Vikas Kumar Chaudhary	Assistant Engineer (Civil) (From 14.02.2020 to till date)
16	Mr. Neeraj Chauhan	Assistant Engineer (Electrical)
17	Mr. Abhijeet Tiwari	Assistant Library Information Officer
18	Mr. Vinod Kumar	Senior Library Information Assistant
19	Ms. Sonali Malhotra	Senior Library Information Assistant
20	Mr. Jitendra Namdev	Senior Library Information Assistant
21	Mr. Lalit Kumar	Junior Technical Superintendent
22	Mr. Hardeep Kumar Singh	Junior Technical Superintendent
23	Mr. Rakesh Kumar	Junior Technical Superintendent
24	Mr. Ramesh Kumar	Junior Superintendent (Accounts)
25	Mr. Kaul Singh	Physical Training Instructor
26	Mr. Pawan Kumar	Junior Superintendent
27	Ms. Lishma Anand	Junior Superintendent
28	Mr. Pavin S. Samuel	Junior Superintendent
29	Mr. Rohit Joshi	Junior Superintendent (Relieved on 06.11.2019)
29	Mr. Dnyaneshwar A. Gudadhe	Junior Superintendent (From 30.12.2019 to till date)

GROUP 'C'

30	Ms. Suchetna Shachi	Senior Assistant
31	Ms. Sushma Kumari	Senior Assistant
32	Mr. Sunil	Senior Assistant
33	Mr. Sushil Kumar Pal	Senior Assistant
34	Mr. Amit Sharma	Senior Lab. Assistant
35	Mr. Ankush Kapil	Senior Lab. Assistant
36	Mr. Sanjay Kumar	Junior Accountant
37	Mr. Girish Pal	Junior Accountant
38	Mr. Vikram Jeet	Junior Accountant
39	Mr. Desh Raj	Junior Lab. Assistant
40	Mr. Dinesh Thakur	Junior Lab. Assistant
41	Mr. Tarun Verma	Junior Lab. Assistant
42	Mr. Gopal	Junior Lab. Assistant (Technical)
43	Mr. Dashmesh Singh	Junior Lab. Assistant (Technical)
44	Mr. Aditya	Junior Assistant

45	Mr. Prakash Singh Negi	Junior Assistant
46	Mr. Anil Kumar	Junior Assistant (From 06.08.2019 to till date)
47	Mr. Nishant Kumar	Junior Assistant (From 06.08.2019 to till date)
48	Mr. Kuldeep	Junior Assistant (From 06.08.2019 to till date)
49	Mr. Prateek	Junior Assistant (From 06.08.2019 to till date)
50	Mr. Anoop Kumar	Junior Assistant (From 06.08.2019 to till date)
51	Mr. Vishal Parmar	Junior Assistant (From 09.08.2019 to till date)
52	Mr. Vineet	Junior Assistant (Relieved on 20.08.2020)
52	Ms. Nalini Singh Gill	Junior Assistant (From 13.08.2019 to till date)
53	Mr. Sameem Khan	Junior Assistant (From 23.08.2019 to till date)
54	Mr. Veomesh Rawat	Junior Assistant (From 04.10.2019 to till date)
55	Mr. Shyam Singh	Driver
56	Mr. Manoj Kumar	Junior Attendant
57	Mr. Leela Dhar	Junior Attendant (Multi Skilled)

20. LIST OF CONTRACT EMPLOYEES
(On Consolidate Emoluments) As on 31.03.2020

Sr. No.	Name	Designation
1	Mr. J. R. Sharma	Consultant (Finance & Accounts Officer)
2	Mr. C. L. Sharma	Consultant [Deputy Registrar (Audit & Legal)]
3	Er. Anil Kumar Jain	Senior Consultant (Part Time)
4	Dr. Shib Nath Jha	Principal Sports Officer
5	Dr. Purnima K. Bajre	Counselor (Part Time)
6	Mr. Ashish Srivastava	Manager (Guest House)
7	Mr. Mandheer Bali	Junior Engineer (Civil)
8	Mr. Deen Dyal	Junior Engineer (Civil)
9	Mr. Daulat Ram	Field Supervisor (Land Records)
10	Ms. Nimisha N.B.	Career & Placement Executive
11	Ms. Ishita Mahanty Nandi	Project Scientist
12	Ms. Debashrita Roy Chowdhury	Web Content Developer
13	Dr. Milan Behl	Medical Offiecr (Ayurveda) (From 08.07.2019 to till date)
14	Dr. O. P. Mahendru	Medical Officer (From 23.03.2020 to till date)
15	Mr. Om Shankar Dwivedi	Deputy Manager (Office Automation) (Relieved on 30.04.2019)
16	Dr. Neha Sharma	Medical Officer (Relieved on 16.05.2019)
17	Dr. Mridu Thakur	Medical Officer (Relieved on 15.09.2019)

18	Dr. Nishank Shekhar	Medical Officer (Specialist) (Relieved on 09.12.2019)
19	Mr. R. S. Raghav	Technical Superintendent (Relieved on 15.01.2020)
20	Dr. Parminder Singh Bhatti	Medical Offiecr (GDMO) (Relieved on 26.02.2020)
21	Mr. Amar Singh	Officer on Special Duty (Relieved on 29.02.2020)
22	Mr. Rajeev Kumar Sharma	Junior Superintendent (Ad-hoc) (Relieved on 30.06.2020)

21. Student Leadership - 2019-20

Mr. Aryan Singh	General Secretary
Mr. Rishabh Dharmani	Cultural Secretary
Mr. Purushottam Goel	Sports Secretary
Mr. Abhigyan Khaund	Technical Secretary
Ms. Nikita Yadav	Literary Secretary
Mr. Sachit Yadav	Hostel Affairs Secretary
Mr. Anand Ramrakhyani	Academic Secretary
Mr. Partha Sarathi Nayek	Research Secretary

Students Admitted in the Institute During the Year 2019-20

22. Ph.D. Scholars – 2019 Batch

SR. NO.	ROLL NO.	NAME	SCHOOL
1	D19001	Gokul Krishna U	SE
2	D19002	Diwakar Singh	SE
3	D19003	Banavath Raju Naik	SE
4	D19004	Manish Kumar	SE
5	D19005	Paras Sahu	SE
6	D19006	Jyoti	SE
7	D19007	Ravi Kumar Sandal	SE
8	D19008	Rahul Kumar Mondal	SE
9	D19009	SandeepYadav	SE
10	D19010	Harsimranjit Kaur	SE
11	D19011	Dak Bahadur Khadka	SE
12	D19012	Mahender Singh	SBS
13	D19013	Divya Rawat	SBS
14	D19014	Sanju Golui	SBS
15	D19015	Himanshu Pant	SBS
16	D19016	Radhika	SBS
17	D19017	Arjun OK	SBS
18	D19018	Rupinder Kaur	SBS
19	D19019	Priya Rawat	SBS
20	D19020	Preeti Rathi	SBS
21	D19021	Kumar Abhinav Mishra	SBS
22	D19022	Ashwani	SBS
23	D19023	Neeraj	SBS
24	D19024	Sumit Kumar	SBS
25	D19025	Mandira Sammaddar	SBS

26	D19026	Shubham Ranjan	SHSS
27	D19027	Raj Purushottam Shirode	SHSS
28	D19028	Kaji Ram Karki	SHSS
29	D19029	Swetla Barwal	SCEE
30	D19030	AkanshaTyagi	SCEE
31	D19031	Shailza Kaundal	SCEE
32	D19032	MD Sadullah	SCEE
33	D19033	Priyanka Choudhary	SBS
34	D19034	Manvendra Singh Chauhan	SCEE
35	D19035	Neha Aswal	SE
36	D19036	Rafiuddin Khan	SCEE
37	D19037	Hrishikesh Tiwary	SCEE
38	D19038	Jeetendra Chaudhary	SCEE
39	D19039	Saurabh Dhiman	SCEE
40	D19040	Amit Dubey	SE
41	D19041	Lokendra Singh	SE
42	D19042	Ashok Kumar Sivarathri	SE
43	D19043	Rajeev Kumar	SE
44	D19044	Minku	SE
45	D19045	Mamta Devi	SE
46	D19046	Sonali Mehra	SE
47	D19047	Eshwar Kuncham	SE
48	D19048	Dheeraj	SBS
49	D19049	Azaz Ahmad	SBS
50	D19050	Anil Kumar	SBS
51	D19051	Pankaj Kumar Singh	SBS
52	D19052	Yogesh Nanasaheb Aher	SBS
53	D19053	Shubham Sharma	SBS
54	D19054	Kush Kaushik	SBS
55	D19055	Shagun Sharma	SBS
56	D19056	Mr. Vivek Sarohi	SBS
57	D19057	Ms. Jyotika Thakur	SBS
58	D19058	Mr. Anand Kumar Keshri	SBS
59	D19059	Ms. Shagun	SBS
60	D19060	Ishani Kapoor	SCEE
61	D19061	Niveda Pareek	SCEE
62	D19062	Geetanjali	SCEE
63	D19063	Bala Naga Lingaiah Ande	SCEE
64	D19064	Ramana Manohar Reddy B	SCEE
65	D19065	Madhu Sudhan Rao Ravada	SCEE
66	D19066	Satya Prakash Singh	SCEE
67	D19067	Nandit Kaushik	SCEE
68	D19068	Mohammad Iqbal Ashraf	SCEE
69	D19069	Hare Krishna Doley	SHSS
70	D19070	Gitanshu Choudhary	SHSS
71	D19071	Muskan Dhandhi	SHSS
72	D19072	Sabita Dutta	SHSS
73	D19073	Chander Moan	SE

23. M.S. Scholars - 2019 Batch

SR. NO.	ROLL NO.	NAME	SCHOOL
1	S19001	Sourabh Dogra	SE
2	S19002	Inderpal Singh	SE
3	S19003	Debarshi Debnath	SE
4	S19004	Rishi Kant Thakur	SE
5	S19005	Fahed Mohd	SE
6	S19006	Amit Kumar	SE
7	S19007	Ayush Gupta	SE
8	S19008	Ekta Chaudhary	SE
9	S19009	Charu Chauhan	SE
10	S19010	Lawaj Thapa	SE
11	S19011	Tushar Saini	SCEE
12	S19012	Sai Sushma P	SCEE
13	S19013	Abhishek Dhyani	SCEE
14	S19014	Jigar Visanji Faria	SCEE
15	S19015	Pratik Pradip Jain	SCEE
16	S19016	Anoushka Banerjee	SCEE
17	S19017	Arpit Nandi	SCEE
18	S19018	Akash K Rao	SCEE
19	S19019	Sweta Karmakar	SCEE
20	S19020	Harsh Katakwar	SCEE
21	S19021	Punitpankaj Dubey	SCEE
22	S19022	Shashank Uttrani	SCEE
23	S19023	Mohsin Asad	SCEE
24	S19024	Anuj Kumar Rao	SCEE
25	S19025	Harshita Arya	SCEE
26	S19026	Uddipan Barooah	SCEE
27	S19027	Arundeshwal	SCEE
28	S19028	Ramanpreet Kaur	SCEE
29	S19029	Prakash Neupane	SCEE

24. B.Tech Students – 2019 Batch

Civil Engineering

SR.NO.	ROLL NO.	STUDENT NAME
1	B19023	Abhinay Agrawal
2	B19024	Aditya Kanwar
3	B19025	Aditya Singh Chauhan
4	B19026	Amit Kumar Singh
5	B19027	Arun Kumar
6	B19028	Ashwin Gautam
7	B19029	Avaneesh Kumar
8	B19030	Daksh Umesh Sarthi
9	B19031	Deepak
10	B19032	Deepak Sharma

11	B19033	Dhruv Pindawala
12	B19034	Gaurav
13	B19035	Govind Kumar Meena
14	B19036	Himanshu Sharma
15	B19037	Jahnavi Garikapati
16	B19038	Katta Charanya
17	B19039	Khubi Kumar
18	B19040	Kumbhar Utkarsha Vitthal
19	B19041	Kunal Kachawa
20	B19042	Manan Tushar Shah
21	B19043	Manish Meena
22	B19044	Mehul Banga
23	B19045	Mohammad Zaman Raza
24	B19046	Muskan Yadav
25	B19047	Nehal Reshu
26	B19048	Nilaksh Pundir
27	B19049	Paras Chandra
28	B19050	Pawan Kumar Saini
29	B19051	Rajesh Fagoriya
30	B19052	Rupesh Kumar
31	B19053	Sahas Goyal
32	B19054	Saikiran Shrinivas Sitawar
33	B19056	Shashwat Singh
34	B19057	Shikha
35	B19058	Shubhanshu Agrawal
36	B19059	Sourav Sehgal
37	B19060	Sumit Meel
38	B19061	Vikash Singh
39	B19062	Yash Aggarwal
40	B19063	Yuvraj Singh Bishnoi

Computer Science & Engineering

SR.NO.	ROLL NO.	STUDENT NAME
1	B19064	Abhishek
2	B19065	Abhishek Parmar
3	B19066	Akkapelli Harshith
4	B19067	Anjali Choudhary
5	B19068	Ankit Kumar
6	B19069	Anmol Bishnoi
7	B19070	Anmolpreet Singh
8	B19071	Anukool Dwivedi
9	B19072	Anurag Chauhan
10	B19073	Aryan Goyal
11	B19074	Aryan Meena
12	B19075	Atul Jain
13	B19076	Bhavna Kosta
14	B19077	Chaitanya Mahajan

15	B19078	Chittiprolu Venupriya
16	B19079	Dhruv Meena
17	B19080	Divyansh Vinayak
18	B19081	Divyasheel Kumar
19	B19082	Gaurav Kumar
20	B19083	Gaurav Sahitya
21	B19084	Ginjala Srishti
22	B19085	Harnaman Kaur
23	B19086	Kadavath Pavan
24	B19087	Kailash Kumar
25	B19088	Katha Sai Karthik
26	B19089	Kshitij Gupta
27	B19090	Lily Rawat
28	B19091	Mandeep Kaur
29	B19092	Manepalli Jaswanth Sai
30	B19093	Mayank Jindal
31	B19094	Mekala Varshitha Sonalika
32	B19095	Mohit Samant
33	B19096	Naveen Saisreenivas Thota
34	B19097	Nippun Sharma
35	B19098	Niveditha N
36	B19099	Panchal Ayuj Sanjaybhai
37	B19100	Paras Jain
38	B19101	Prashant Kumar
39	B19102	Priyanshu Kumar Singh
40	B19103	Rachit Tiwari
41	B19104	Rahul Kumar
42	B19105	Rajat Kaushik
43	B19106	Ramteke Parag Sunil
44	B19107	Rishabh Garg
45	B19108	Rohan Raj Kansal
46	B19109	S Samarth Reddy
47	B19110	Sagar Tarafdar
48	B19111	Saloni Patidar
49	B19112	Samarth Neema
50	B19113	Saurabh Kumar Meena
51	B19114	Shashwat Mishra
52	B19115	Shreya Aggarwal
53	B19116	Smriti Srivastava
54	B19117	Sudini Sandeep Reddy
55	B19118	Sumit Kumar
56	B19119	Sumit Kumar Yadav
57	B19120	Surendra Singh
58	B19121	Veeransh Singh
59	B19122	Vineet Ahuja
60	B19123	Yamini Sharma

Data Science & Engineering

SR.NO.	ROLL NO.	STUDENT NAME
1	B19124	Aaron Thomas Joseph
2	B19125	Akanksha Sinha
3	B19126	Akriti
4	B19127	Anshika Bajpai
5	B19128	Ayush Raj Patwa
6	B19129	Dheeraj Kumar
7	B19130	Gajraj Singh Chouhan
8	B19131	Gaurav Kumar
9	B19132	Kushagra Chaturvedi
10	B19133	Nuka Rohan
11	B19134	Om Kumar Hanote
12	B19135	Parshva Jain
13	B19136	Pranshu Kharkwal
14	B19137	Roshit Anand
15	B19138	Sagar Kumar
16	B19139	Sanjana K
17	B19140	Shubham Prajapati
18	B19141	Tammireddy Sasank
19	B19142	Utkarsh Kaushik
20	B19143	Vipin Kumar
21	B19144	Yash Verma
22	B19145	Yashasvi Padam

Electrical Engineering

SR.NO.	ROLL NO.	STUDENT NAME
1	B19146	Abhishek Sihag
2	B19147	Akash Karnatak
3	B19149	Aman Saini
4	B19150	Anshul
5	B19151	Anshul Narwal
6	B19152	Aqib Afzal
7	B19153	Aryan Garg
8	B19154	Bharat Singh
9	B19155	Bharde Aditya Gangadhar
10	B19156	Binti Padaliya
11	B19157	Chithaluri Sujith
12	B19158	Deepak Khatri
13	B19159	Dev Agrawal
14	B19160	Dhanavath Jagadish
15	B19161	Divyansh Mangla
16	B19162	Durgendra Kumar
17	B19163	Harsh
18	B19164	Harshit Chaudhary
19	B19165	Jai Pahal
20	B19166	Jaykishan Prajapati
21	B19167	Jitesh Kumar Meena

22	B19168	Krati Khinchi
23	B19169	Kratika Gupta
24	B19170	Kushagra Rathore
25	B19171	Lasini Vippakayala
26	B19172	Manisha Prasad
27	B19173	Mayank Bihani
28	B19174	Naveen Khangrawat
29	B19175	Naveen Kumar Maheshwari
30	B19176	Nayan Vinod Kharkar
31	B19178	Pandi Siddharth
32	B19179	Piyush
33	B19180	Piyush Ranjan
34	B19181	Prabhjot Singh
35	B19182	Prajwal Sood
36	B19183	Pranav Sudam Adlinge
37	B19184	Pratham Goyal
38	B19185	Pratiksha Jain
39	B19186	Pratyaksh Khullar
40	B19187	Pritish Chugh
41	B19188	Priyam Seth
42	B19189	Priyanshu Shubham
43	B19190	Priyanshu Singh
44	B19191	Ravi Kumar
45	B19192	Ridhi Ratan
46	B19193	Sandadi Sanvi Reddy
47	B19194	Sarthak Kumar Morj
48	B19195	Shobhit
49	B19196	Siddharth Dhama
50	B19197	Talla Lahari
51	B19198	Tarun Singla
52	B19199	Tushar Rao
53	B19200	Tushika Singh
54	B19201	Ujjwal Rana
55	B19202	Vadlamannati Madhumita

Engineering Physics

SR.NO.	ROLL NO.	STUDENT NAME
1	B19204	Aluru Anitha
2	B19205	Ananay Sood
3	B19206	Aniruddha Prakash
4	B19207	Aniru dh Singh
5	B19208	Atpadkar Vaidehi Vaibhav
6	B19209	Deepali Singh
7	B19210	Digumarthi Samuel Raj
8	B19211	Gagan
9	B19213	L Jayabalaji
10	B19215	Md Akram Khan
11	B19216	Mohammed Abdul Taufeeq

12	B19217	Nikhil Verma
13	B19218	Rashmi
14	B19219	Rishabhanand Rajesh Jha
15	B19220	Shaik Mohammad Shoeb
16	B19221	Shivvrat Singh
17	B19222	Shubham Saurav
18	B19224	Tandel Jainan Naresh Kumar
19	B19225	Yuvraj Misra

Mechanical Engineering

SR.NO.	ROLL NO.	STUDENT NAME
1	B19226	Aakash Solanki
2	B19227	Aarti Anand
3	B19228	Aashi Agarwal
4	B19229	Aayush Sharma
5	B19231	Abhishek Mishra
6	B19232	Aditee Prasad
7	B19233	Aditya Jeengar
8	B19234	Akansh Singhal
9	B19235	Akshansh Dhiman
10	B19236	Ankit
11	B19237	Ankit Gomladu
12	B19239	Arjun Khanwalkar
13	B19240	Arpit Singh G ahlot
14	B19241	Ayush Singh Vardhan
15	B19242	C Giri Varshith
16	B19243	Chavan Dhanush
17	B19244	Deepanshu Kumar Gupta
18	B19245	Devansh Kochar
19	B19246	Divyam
20	B19247	Jai Prakash Yadav
21	B19248	Khan Yasir Iftekhar
22	B19249	Kirori Lal Meena
23	B19250	Kummara Manjunath
24	B19251	Kuruba Govardhan
25	B19252	Mahendrakar Tanmay
26	B19253	Monya Tanyang
27	B19254	Pardeep Singh
28	B19255	Pooja Patidar
29	B19256	Preetam Raj
30	B19257	Prithviraj Gajanan Jadhav
31	B19258	Rachita Arora
32	B19259	Raushan Raj
33	B19260	Rigzin Norboo
34	B19261	Rishav Raj
35	B19262	Ritwik Kumar Kamesh
36	B19263	Sagar Paliwal
37	B19264	Shardul Semwal
38	B19265	Shinde Shweta Manohar

39	B19266	Shivani Pandey
40	B19267	Shubham
41	B19268	Solai Adithya A
42	B19269	Tanisha Gautam
43	B19270	Tanu Gupta
44	B19271	Vedansh Gupta
45	B19272	Yatharth Mogra
46	B19273	Yogesh Niranjan
47	B19274	Yogesh Panjwani

25. B.Tech. – M.Tech. Integrated Dual Degree in Bio-Engineering

SR.NO.	ROLL NO.	STUDENT NAME
1	B19001	Aarushi Gajri
2	B19002	Aditya Narayan Khokhar
3	B19003	Aditya Sarkar
4	B19004	Anooshka Bajaj
5	B19005	Bellamkonda Krishnasai
6	B19006	Chirag
7	B19007	Hritik Chouhan
8	B19008	Kanchi Sam Vivek
9	B19009	Kombade Mahesh Vishwanath
10	B19010	Kshitij Nair
11	B19011	Laishram Pongthangamba Meitei
12	B19012	Lalit Narayan Mudgal
13	B19013	Muhammad Adil CT
14	B19015	Prashant Kumar
15	B19016	Sagar Mishra
16	B19018	Sarthak Garg
17	B19020	Shedge Janhavi Mangesh
18	B19021	Shivam Sundram
19	B19022	Shubham Mehra

26. M.Sc. (Chemistry)

SR.NO.	ROLL NO.	STUDENT NAME
1	V19001	Deepanshi
2	V19002	Akshansh Kaushik
3	V19003	Gaurav Kumar
4	V19004	Swati Jain
5	V19005	Tanisha Singhal
6	V19006	Khushboo Varshney
7	V19007	Shivangi Singh Chauhan
8	V19008	Nikita Kunwar
9	V19009	Sapna Rawat
10	V19010	Vyom Prakash Tyagi
11	V19011	Shivani Nagendra Tiwari
12	V19012	Priyanka Jain

13	V19013	Rupali Bharatsingh Pawar
14	V19014	Prachi Dwivedi
15	V19016	Hari Prakash Shukla
16	V19017	Aakashdeep
17	V19018	Yash Singla
18	V19019	Palak Majithia
19	V19020	Ankit
20	V19021	Rohit Yadav
21	V19022	Varsha Verma
22	V19023	Akhilesh Sharma
23	V19024	Hardev Kumar
24	V19025	Sumit Yadav
25	V19026	Aditya Jaiswal
26	V19027	Anurag Yadav
27	V19028	Ritu
28	V19029	Kirti
29	V19030	Richa
30	V19031	Jagmohan
31	V19032	G. Chanchal Kumar Nayak
32	V19033	Honourius Mebansharai Dohling
33	V19034	Martha Perme
34	V19094	Narender Kumar
35	V19095	Harsh Kumar

27. M.Sc. (Applied Mathematics)

SR.NO.	ROLL NO.	STUDENT NAME
1	V19055	Ajay Kumar Marodiya
2	V19056	Aniruddh Ghosle
3	V19057	Anju
4	V19058	Anshika Dubey
5	V19059	Aryan Bhambu
6	V19060	Ashu Kumar
7	V19061	Ashutosh
8	V19062	Bhukya Ram Kumar
9	V19063	Deepak Kumar
10	V19064	Himalaya Prakash
11	V19065	Jahanvi Rajput
12	V19066	Jaiprakash
13	V19068	Manisha
14	V19069	Meenu Rani
15	V19070	Murari Lal
16	V19071	Nidhi Kaushik
17	V19073	Palak Aggarwal
18	V19074	Parteek Kumar
19	V19075	Pranchal Jain
20	V19076	Rakshit Kumar Tyagi

21	V19077	Rovit Kumar
22	V19078	Sagar
23	V19079	Sakshi Jain
24	V19080	Satya Pal Jakhar
25	V19081	Saurabh Mishra
26	V19082	Shivendu Prasad
27	V19083	Subhash Kumar Sonkariya
28	V19084	Tanay Kumar Gupta
29	V19085	Tushar Gupta
30	V19086	Vidisha Singh
31	V19087	Vikas Mehriya
32	V19088	Vikash Bharia
33	V19089	Vivek Kumar
34	V19096	Kumuda Sharma
35	V19097	Priya
36	V19098	Jagseer Singh
37	V19099	Indrajit Nath

28. M.Sc. (Physics)

SR.NO.	ROLL NO.	STUDENT NAME
1	V19035	Kundan Verma
2	V19036	Apoorav Singh Deo
3	V19037	Sushank Mishra
4	V19038	Kashik Chauhan
5	V19039	Shagun Kumar
6	V19040	Sonali Kumawat
7	V19041	Rakesh Somarwal
8	V19042	Jayant Kumar Gupta
9	V19043	Saurabh Yadav
10	V19045	Mahaveer
11	V19046	Rajendra Kumar Raigar
12	V19047	Sumit Kumar
13	V19048	Vinod Kumar Solet
14	V19049	Alka Kumari
15	V19050	Vinit
16	V19051	Gulshan Sharma
17	V19052	Monika Singh
18	V19053	Avinesh Kumar
19	V19054	Shyam Sundar Meena
20	V19090	Karun Gadge
21	V19091	Akansha Verma
22	V19092	Prithivraj G
23	V19093	Brijesh Gupta

24	V19100	Apoorv Dashora
25	V19101	Rupal Gupta
26	V19102	Abhishek Pandey
27	V19103	Kanika Rani
28	V19104	Vikas Yadav
29	V19105	Pratibha Yadav

29. M.Tech. (Structural Engineering)

SR.NO.	ROLL NO.	STUDENT NAME
1	T19001	Harshit Agarwal
2	T19002	Shivam Parashar
3	T19003	Aman Thakur
4	T19004	Nivedita
5	T19005	Suneet Kumar
6	T19006	Rohit Rawat
7	T19007	Vemireddy Gandhi Reddy
8	T19008	Bhawani Shankar Kumawat
9	T19009	Amit Kumar
10	T19010	Puneeta Dutta
11	T19011	Sahil Walia
12	T19012	Arjun Pratap Chauhan
13	T19013	Ashwani Kumar Sharma
14	T19014	Ayush Kumar Tiwari
15	T19015	Huzaifa Saifuddin Electricwala
16	T19016	Parvez Barkat Khan
17	T19017	Divya Yadav
18	T19018	Akhil Verma
19	T19019	Gagan Patel
20	T19020	Jai Chhagan Dorle
21	T19021	Baddipalli Shivalinga
22	T19022	Deepak Kumar
23	T19023	Dharani Raj SV
24	T19024	Bhavana Arya
25	T19025	Arun Kumar
26	T19026	Parveen Kumar
27	T19027	Ajay Kumar
28	T19028	Navneet
29	T19029	Sneha

30. M.Tech. (Mechanical Engineering with Specialization in Energy Systems)

SR.NO.	ROLL NO.	STUDENT NAME
1	T19030	Rajat Chauhan
2	T19031	Manmeet Singh
3	T19032	Siddharth Singh Lalotra
4	T19033	Kaustubh Singhal
5	T19034	Ankita Pundeer
6	T19035	Alankrit Srivastava
7	T19036	Rajkumar Gupta
8	T19037	Rajat Sharma
9	T19038	Shubham Dutt Attri
10	T19039	Utkarsh Deep Tiwari
11	T19040	Yash Shekvani
12	T19041	Sachin Rawat
13	T19042	Karan Chilwal
14	T19043	Arpit Pathak
15	T19044	Shyam Kishor Sharma
16	T19045	Mohit Kumar Sahu
17	T19046	Shivendra Chaudhary
18	T19047	Saket Sahu
19	T19048	Rohit Rana
20	T19049	Jaydeep Singh
21	T19050	Abhishek Singh
22	T19051	Rohit Verma
23	T19052	Shubham Desai
24	T19053	Ravi Pippal
25	T19073	Pushpendra Kumar
26	T19074	Ketan Arora
27	T19077	Shubham Dubey

31. M.Tech. (Energy Engineering with Specialization in Materials)

SR.NO.	ROLL NO.	STUDENT NAME
1	T19054	Anupam Nigam
2	T19055	Vaibhav Chaudhary
3	T19056	Mithilesh Singh
4	T19057	Debanshu Shrivastava
5	T19058	Vishal Sharma
6	T19059	Jyoti Sharma
7	T19061	Lokesh
8	T19062	Kamal Chauhan

9	T19063	Jagat Pal
10	T19064	Mukesh Maurya
11	T19065	Swapnil Pandurang Karale
12	T19066	Shivendra Singh Yadav
13	T19067	Ankit Jaisswal
14	T19068	Navodita Charan
15	T19070	Narendra Kumar Verma
16	T19071	Anuj
17	T19072	Aabiroo Amin Bhat
18	T19075	Satvik Rai
19	T19076	Aniket Pati

32. M.Tech. in VLSI

SR.NO.	ROLL NO.	STUDENT NAME
1	T19121	Amit
2	T19122	Osho Gera
3	T19123	Pawan Bhakuni
4	T19124	Sachin
5	T19125	Rishabh Soni
6	T19126	Shivam
7	T19127	Jashan
8	T19128	Saurabh Trivedi
9	T19129	Rajat Kumar
10	T19134	Vikas Thakur
11	T19135	Vikas Chowdhary
12	T19136	Prakash Kumar Saw
13	T19140	Girija Shankar Dhawal
14	T19142	Kumari Suravi
15	T19143	Shubham Srivastava
16	T19144	Shashank Mourya
17	T19145	Tejas Kumar Hoizal
18	T19149	Dibyendu Maji
19	T19150	Sarang PC
20	T19151	Shubham Saxena
21	T19152	Vineet Gupta
22	T19157	Vipin Kumar
23	T19158	Ajay Chauhan
24	T19169	Sachin Tamta
25	T19171	Sumit Kumar Mishra
26	T19172	Divyanshu
27	T19173	Gowtham PK
28	T19175	Pilli Hem Chaitnya Reddy
29	T19176	Devarshi Malik

33. M.Tech. (Power Electronics and Drives)

SR.NO.	ROLL NO.	STUDENT NAME
1	T19102	Vijay Kumar
2	T19116	Abhishek Singhal
3	T19117	Ashutosh Rai
4	T19118	Akriti Garg
5	T19119	Nitin Chauhan
6	T19120	Ekansh Kapoor
7	T19131	Sairakshit Keesara
8	T19132	Jasvant Singh
9	T19133	Pranav Kumar Jha
10	T19139	Sreeraj P Nambiar
11	T19146	Ayan Kr Jana
12	T19147	Kumar Vaibhav Tejan
13	T19155	Md. Khalid Raza Khan
14	T19161	Amit Kumar
15	T19163	Arvind Godara
16	T19164	Pravin Pilania
17	T19166	Ranjini Sinha
18	T19167	Mrinalkanti Mandal
19	T19174	Lakshmi Priya
20	T19177	Atul Panday
21	T19178	Nitish Kumar

34. M.Tech. (Communication and Signal Processing)

SR.NO.	ROLL NO.	STUDENT NAME
1	T19101	Ravi Kumar
2	T19103	Shantanu Srivastava
3	T19105	Deepak Kumar Yadav
4	T19107	Omna Jain
5	T19110	Priyanka Mankar
6	T19115	Anurag Mohan Pathak
7	T19130	Anil Kumar Keshri
8	T19137	Ankit Katiyar
9	T19138	Manvendra Singh Hada
10	T19153	Tanya Tiwari
11	T19154	Manoj Sharma
12	T19156	Divya Sharma
13	T19159	Medapalli Surya Vamsi

14	T19160	Aartesh Shekhar Singh
15	T19162	Chandresh Kumar
16	T19165	Tirthashree
17	T19168	Vaibhav Tripathi
18	T19170	Naveen Lather

35. M.Tech. (Biotechnology)

SR.NO.	ROLL NO.	STUDENT NAME
1	T19201	Neha Agyal
2	T19202	Giredhar Muthiah
3	T19203	Anik Biswas
4	T19204	Konari Jeevita
5	T19205	Kashmira Dey
6	T19206	Shriya Srivastava
7	T19207	Sumit Kumar Show
8	T19208	Rakshita Saxena
9	T19210	Saheli Sarkar
10	T19211	Purba Mukherjee
11	T19212	Nitin Keshav Patil
12	T19213	Aastha
13	T19214	Ashutosh Sahoo
14	T19215	Mira Koul
15	T19216	Naha Singh
16	T19217	Aparna Goswami

36. M.A (Development Studies)

SR.NO.	ROLL NO.	STUDENT NAME
1	A19001	Akshay Thakur
2	A19003	Akanksha Singh
3	A19005	Bijoya Sarkar
4	A19006	Sahil B Gaikwad
5	A19007	Thirukkovela Srichandra
6	A19008	Princi Gupta
7	A19009	Zeeshan Fatma
8	A19010	Muhammed Rashid
9	A19011	Yash Agarwal
10	A19012	Sai Thejaswini Kalasamudram
11	A19013	Pawan Thakur
12	A19014	Yashpal Luniwal
13	A19015	Jaideep Gaikwad

37. I-Ph.D. (Physics)

SR.NO.	ROLL NO.	STUDENT NAME
1	DI-1903	Vivek Pandey
2	DI-1904	Shivani Bhardwaj
3	DI-1905	Bhumit Luhar

Indian Institute of Technology Mandi

The Registrar
Indian Institute of Technology Mandi
Kamand VPO, Distt. Mandi, Himachal Pradesh - 175075
Telephone +91-1905-267015, Fax : +91 +91-1905-267075
email: registrar@iitmandi.ac.in