

भारतीय प्रौद्योगिकी संस्थान मण्डी
कमांद-175075, हिमाचल प्रदेश

**INDIAN INSTITUTE OF TECHNOLOGY MANDI
KAMAND – 175075, HIMACHAL PRADESH**



कार्य सूची

AGENDA

छत्तीसवीं सीनेट बैठक सूची

AGENDA FOR THE 36th SENATE MEETING

बैठक सं०	:	छत्तीसवीं
MEETING NO.	:	THIRTY SIXTH
स्थान	:	सभा कक्ष, सी. वी. रमन अतिथि गृह, आई. आई. टी. मण्डी
VENUE	:	CONFERENCE ROOM, C. V. RAMAN GUEST HOUSE, IIT MANDI
दिनांक	:	15 सितम्बर, 2022
DATE	:	15 th September, 2022
समय	:	03:30 अपराह्न
TIME	:	03:30 P.M.

**INDIAN INSTITUTE OF TECHNOLOGY MANDI
KAMAND, HIMACHAL PRADESH**



**36th SENATE MEETING
THURSDAY, 15th September, 2022**

AGENDA

Item No.	Agenda items	Page No.
PART – A		
36.1	To confirm the minutes of the 35 th Senate meeting held on 2 nd June, 2022.	4
36.2	To receive a report on the actions taken for the decisions taken in the 35 th Senate meeting held on 2 nd June, 2022.	4-5
36.3	To consider the recommendations regarding Awards and Medals.	5
36.4	To consider award of Ph.D., I-Ph.D. (Physics), M.S. (by Research), M.Tech. M.Sc., M.A. and B.Tech. degree.	5-6
36.5	To consider the award of Medals and Prizes to the winners among the graduands, which are to be awarded during the 10 th Convocation of the Institute.	6
36.6	To consider the proposal for establishment of Centre for Robotics and Artificial Intelligence (CRAI).	6
36.7	Any other agenda item with the permission of the Chairman, Senate.	6
36.8	To report decisions/action taken by the Chairman, Senate.	6-13
PART-B		
36.9	Issues to be discussed by the Senate without Student Members being present.	15

PART – ‘A’

Item No. 36.1: To confirm the minutes of the 35th Senate meeting held on 2nd June, 2022.

The minutes of the 35th Senate meeting held on 2nd June, 2022 at IIT Mandi were circulated to members of the Senate on 21st June, 2022 (through email) for comments, if any. No comments have been received on the minutes.

In view of the above, the Senate may consider confirming the minutes of 35th Senate meeting of the Institute.

Item No. 36.2: To receive a report on the actions taken for the decisions taken in the 35th Senate meeting held on 2nd June, 2022.

Given below are the details of actions taken for the decisions taken in 35th Senate meeting held on 2nd June, 2022.

Item No.	Particulars	Status of Action Taken
35.3	To consider a policy across the institute regarding Academic Dishonesty Policy.	To be presented in subsequent Senate meeting.
35.4	To consider the proposal for modification in Minor in German.	Approved and Notified vide Notification No. IIT Mandi/Acad/Senate/2022/3659-62 dated 02-09-2022.
35.5	To consider the recommendations of the committee for Academic Organization / Structure of the Schools.	Approved and Notified vide Notification No. IIT Mandi/Acad/BoG/2022/1993-96 dated 06-07-2022.
35.6	To consider a proposal to establish a Center on Indian Knowledge System and Mental Health (CIKSMH).	Approved and Notified vide Notification No. IIT Mandi/Acad/BoG/2022/2007-09 dated 06-07-2022.
35.7	To consider a proposal to start a new MBA programme from Academic Year 2022-23.	Approved and Notified vide Notification No. IIT Mandi/Acad/BoG/2022/1990-92 dated 06-07-2022.
35.8	To consider the revision in fee waiver policy for UG Female students.	Under Consideration.
35.9	To consider a proposal for modification in Fee Structure for AY 2022-23.	Approved and Notified vide Notification No. IIT Mandi/Acad/2022-23/2047-60 dated 08-07-2022.
35.10	To consider the revision in the Regulations of the MS/PhD programme regarding course selection approval by Supervisor/Guide.	Approved and Notified vide Notification No. IIT Mandi/Acad/Senate/2022/3663-64 dated 02-09-2022.
35.11	To consider the revision in the Regulations for the MS/PhD programme regarding ERP/Part -Time scholars and amendment in allotment	Approved and Notified vide Notification No. IIT Mandi/Acad/Senate/2022/3665-66 dated 02-09-2022.

	of caretaker faculty-in-charge/ co-guide in the absence of guide.	
35.12	To consider the modified proposal regarding Exit options for IDD (Bioengineering) students after 4 th year.	Approved and Notified vide Notification No. IIT Mandi/Acad/Senate/2022/1115-18 dated 22-06-2022.
35.13	To consider the proposal for Second Major in Bioengineering programme.	Approved and Notified vide Notification No. IIT Mandi/Acad/Senate/2022/3667 dated 02-09-2022.
35.14	To consider revision in the curriculum for M.Tech. in VLSI programme.	Approved and Notified vide Notification No. IIT Mandi/Acad/Senate/2022/3668 dated 02-09-2022.
35.15	To consider the minor modification in FTE programme.	Approved and Notified vide Notification No. IIT Mandi/Acad/Senate/2022/3669 dated 02-09-2022.
35.16	To consider a proposal for Entrepreneurship Practicum.	Approved and Notified vide Notification No. IIT Mandi/Acad/Senate/2022/3670-71 dated 02-09-2022.

Item No. 36.3: To consider the recommendations regarding Awards and Medals.

In the 47th meeting of the Board of Academics held on 6th and 7th September, 2022, Dr. C. S. Yadav, Chair of the designated committee, presented the proposal/recommendations regarding Awards and Medals for graduating batches. After discussions, the BoA recommended the proposal, as placed at **Annexure-A; Page No. 16** to the Senate for consideration and approval.

Item No. 36.4: To consider award of Ph.D., I-Ph.D. (Physics), M.S. (by Research), M.Tech. M.Sc., M.A. and B.Tech. degree.

Number of the students who have completed all the requirements for award of the degrees during 10th Convocation are given below. Complete list of students qualified for various degrees will be tabled during the meeting of the Senate for consideration.

Programme	No. of students
Ph.D.	37
M.S. (by Research)	17
I-Ph.D.	2
M.Tech in MES	7
M.Tech in EEM	12
M.Tech. in STE	11
M.Tech in VLSI	14
M.Tech in PED	13
M.Tech in SPCOM	3
M.Tech in BioTech	12
M.Sc. (Chem)	39

M.Sc. (Maths)	31
M.Sc. (Physics)	25
MA	10
B.Tech	175
Total	408

Item No. 36.5: To consider the award of Medals and Prizes to the winners among the graduands, which are to be awarded during the 10th Convocation of the Institute.

The awards committee will present the recommendations during the Senate meeting.

Item No. 36.6: To consider the proposal for establishment of Centre for Robotics and Artificial Intelligence (CRAI).

Proposal received from the Dean (Academics) for establishment of Centre for Robotics and Artificial Intelligence (CRAI) is placed at **Annexure-B; Page No. 17 to 19** for consideration of the Senate.

Item No. 36.7: Any other agenda item with the permission of the Chairman, Senate.

Item No. 36.8: To report decisions/action taken by the Chairman, Senate.

(i) **Revision in Academic Calendar of AY 2021-22 (Summer Term 2022) AS3:** Considering the requests from the students, the Summer Term 2022 (June-August) begins from 27th June, 2022, Grade submission on 08th August, 2022 and Ends by 09th August, 2022. **(Approved on 30th May, 2022)**

(ii) **Approval to relax Minimum Eligibility Criteria for MBA:**

The Committee requested for second round of MBA admissions with modified relaxed criteria given below. **(Approved on 26th July, 2022).**

- GEN/EWS Indian national applicants: Minimum 7 CGPA on a 10-points scale or 70% marks in a **degree of full time Bachelors' degree of minimum 3 years or full time Master's degree of minimum 2 years from any of the Centrally Funded Technical Institutions (CFTIs)/or NIRF ranking 2022(Top 100 Institutes) of overall category.** Such candidates are exempted from the requirement of CAT.

- SC/ST/PwD/OBC(NCL) Indian national applicants: Minimum 6.5 CGPA on a 10-points scale or 65% marks in a **degree of full time bachelors' of minimum 3 years or full time Master's degree of minimum 2 years from any of the Centrally Funded Technical Institutions (CFTIs)/or NIRF ranking 2022(Top 100 Institutes) of overall category**. Such candidates are exempted from the requirement of CAT.
 - The non-CFTI criteria remain unchanged.
- (iii) **Regarding exemption for financial proposal for International Conference, National Conference and Field Trips etc.:** Option for availing financial support of Rs. One Lakh as per revised ceiling extended to existing scholars irrespective of the previously availed National conferences/Field Trips etc. **(Approved on 26th July, 2022)**
- (iv) **Regarding credit transfer and waiving off Comprehensive Examination:** Mr. Prashant Rawat (D21112), joined Ph.D on 1st January, 2022 on Lateral Entry Basis from IISER Kolkata), credit transferred and Comprehensive exam waived off. **(Approved on 23rd August, 2022)**
- (v) **Withdrawal from the programme during (7th June, 2022 – 23-08-2022):**

The following students resigned and requested for withdrawal which was recommended by their Faculty Advisor/ Guide/ DC/ School Chair. Consequently, Chairman, Senate approved their withdrawal from the programme.

Sl.No	Roll No.	Student Name	School/ Branch	Program	Date of Joining	Date of Resignation Accepted
1	T20213	Deepak	SCEE	M.Tech.	16-09-2020	07-06-2022
2	D21090	Tuhin Paul	SBS	Ph.D.	15-02-2021	08-06-2022
3	T21162	Sandeep Vedanarayana	SBS	M.Tech.	09-08-2021	13-06-2022
4	D20050	Anant Kumar Singh	SCEE	Ph.D.	15-02-2021	29-06-2022
5	T20209	Hitesh Kumar Fulwariya	SCEE	M.Tech.	16-09-2020	04-07-2022
6	A20003	Arvind Venkatesh Iyer	SHSS	MA	16-09-2020	04-07-2022
7	D21115	Mamaru Bitew Alem	SBS	Ph.D.	02-03-2022	04-07-2022
8	D21102	Prashant Pandey	SBS	Ph.D.	15-02-2022	08-07-2022
9	D21078	Suraj Kumar Mishra	SE	Ph.D.	15-02-2022	26-07-2022
10	S20017	Nilotpal Kalita	SE	M.S.	15-02-2021	26-07-2022
11	B21095	Desai Khilan Sanjaybhai	SCEE	B.Tech.	24-11-2021	26-07-2022
12	V22059	Avik Guchait	SCS	M.Sc.	10-08-2022	23-08-2022

13	D21113	Asaminew Yerango Shimolo	SCS	Ph.D.	24-02-2022	23-08-2022
14	D21108	Meenakshi Appasaheb Shegane	SE	Ph.D.	15-02-2022	23-08-2022

(vi) Cancellation of registration/termination from the programme during (13th June, 2022):

The following students registrations were cancelled/terminated from the programme which was recommended by their Faculty Advisor/Guide/DC/School Chair. Consequently, Chairman, Senate approved their cancellation of registration from the programme.

SI.No	Roll No.	Student Name	Branch/School	Program	Date of Joining	Date of Cancellation	Reasons for cancellation
1	T21093	Subhranil Mondal	SCEE	M.Tech.	09-08-2021	13-06-2022	Not attended the classes, did not respond the email communication, non-registration and non-payment of fee
2	T21085	Harshita Meena	SCEE	M.Tech.	09-08-2021	13-06-2022	Not attended the classes, did not respond the email communication, non-registration and non-payment of fee
3	T20203	Shubham Kumar	SCEE	M.Tech.	16-09-2020	13-06-2022	Not attended the classes, did not respond the email communication, non-registration and non-payment of fee

(vii) Provisional Certificate issued to M.S. / Ph.D. scholars after 9th Convocation (approved during 26th May, 2022 – 02nd September, 2022):

On completion of all requirements of M.S./Ph.D., Provisional Degree Certificates have been issued to following students:

SI.No	Roll No.	Student Name	Programme	School	Date of Joining	Provisional Certificate issued on
1	S19001	Sourabh Dogra	M.S.	SE	01-08-2019	26-05-2022
2	S20024	Yeturi Pramodkumar Reddy	M.S.	SE	01-02-2019 (in Ph.D.) Converted to M.S. on 02-06-2021	13-06-2022
3	D15039	Akansha Garg	Ph.D.	SCEE	18-08-2015	20-06-2022

4	D16045	Shailja Sharma	Ph.D.	SBS	01-02-2017	20-06-2022
5	D15032	Afsal Thuppilakkadan	Ph.D.	SBS	27-07-2015	23-06-2022
6	D12089	Prateepsingh Sagara	Ph.D.	SBS	28-02-2013	23-06-2022
7	D16037	Diksha Gambhir	Ph.D.	SBS	15-11-2016	23-06-2022
8	ERPD1302	Mritunjay Kumar Shukla	Ph.D.	SE	02-04-2014	04-07-2022
9	D17055	Bhupinder Singh	Ph.D.	SE	01-02-2018	04-07-2022
10	S19009	Charu Chauhan	M.S.	SE	01-08-2019	07-07-2022
11	D16030	Korakuti Hanumanthu	Ph.D.	SE	05-08-2016	08-07-2022
12	S18026	Kamalpreet Singh	M.S.	SE	04-02-2019	08-07-2022
13	S19017	Arpit Nandi	M.S.	SCEE	01-08-2019	08-07-2022
14	D16007	Mohammad Ghulam Moinuddin	Ph.D.	SCEE	25-07-2016	26-07-2022
15	D16056	Tripti Chhabra	Ph.D.	SE	01-02-2017	26-07-2022
16	DI1506	Swati Mudra	I-Ph.D.	SBS	17-08-2015	26-07-2022
17	S18002	Mohana Singh	M.S.	SCEE	01-08-2018	26-07-2022
18	D16012	Harpreet Kaur	Ph.D.	SBS	01-08-2016	02-08-2022
19	D16049	Chethana	Ph.D.	SBS	01-02-2017	08-08-2022
20	D16057	Divya Verma	Ph.D.	SE	01-02-2017	13-08-2022
21	S20023	Sahil Verma	M.S.	SE	01-08-2018 (in Ph.D.) Converted to M.S. on 12-05-2021	23-08-2022
22	S18005	Ganesan P	M.S.	SCEE	01-08-2018	02-09-2022
23	S18022	Rushiraj Sunil Jawale	M.S.	SCEE	01-02-2019	02-09-2022
24	D16066	Dinesh Kumar B	Ph.D.	SCEE	01-02-2017	02-09-2022
25	D17018	Chaurasiya Rohit Budhiram	Ph.D.	SCEE	18-08-2017	02-09-2022
26	D16033	Ajay Kumar	Ph.D.	SMME	05-08-2016	02-09-2022

(viii) Provisional Certificates issued to B.Tech/M.Sc./M.A./M.Tech. students (after 9th Convocation):

The following number of students of B.Tech./M.Sc./M.Tech./M.A. students have completed all the requirements of the programme. On the approval of the Chairman, Senate, Provisional Certificates have been issued to the students.

Programme	No. of students
B.Tech.	174+ 1(2017 batch)
M.Sc. (Chem)	39
M.Sc. (Maths)	31
M.Sc. (Physics)	25
M.A.	10

M.Tech in MES	6 + 1 (2019 batch)
M.Tech in EEM	12
M.Tech. in SE	10 + 1(2019 batch)
M.Tech in VLSI	14
M.Tech in PED	13
M.Tech in SPCOM	2 + 1 (2019 batch)
M.Tech in BioTech	12
Total	352

(ix) Conversion from Regular M.S. (by Research) Programme to Part Time Programme (Approved on 26th July, 2022):

On the recommendations of the Guide, School Chair, AD (Research) and Dean (Academics), Chairman Senate has approved the conversion from regular M.S. (by Research) to part-time M.S. (by Research) programme of the given below student:

SI.No	Roll No.	Student Name	School	Guide	Date of Joining	Date of Conversion
1	S20014	Shikha Sharma	SE	Dr. Kala Venkata Uday	15-02-2021	26-07-2022

(x) Conversion to M.Tech. + Ph.D. Dual Degree Programme (Approved on 26th July, 2022):

On the recommendations of the Guide, Doctoral Committee, School Chair, AD (Research) and Dean (Academics), Chairman Senate has approved the conversion to M.Tech. + Ph.D. Dual Degree Programme of the given below student:

SI.No	Roll No.	Student Name	School	Guide	Date of Joining	Date of Conversion
1	D19039	Saurabh Dhiman	SCEE	Dr. Hitesh Shrimali	13-08-2018 (in M.Tech) 17-10-2019 (Regular Ph.D)	26-07-2022

(xi) Relaxation to Ph.D. students to appear in Comprehensive exam in different school:

On the recommendations of the Guide, School Chair, AD (Research) and Dean (Academics), Chairman Senate has approved the relaxation to Ph.D. students to appear in Comprehensive Exam in different school to the given below students:

SI.No	Roll No.	Student Name	School	Comprehensive Exam School	Date of Approval
1	D20054	Vineet	SCEE	SMME	04-08-2022
2	D21040	Akumalla Ravi Kiran	SMME	SCEE	26-08-2022

(xii) To report Seat Matrix for UG/MBA/PG/MTech (by Research)/Ph.D. programmes for AY 2022-23:

Seat Matrix for UG programme for AY 2022-23 (*Approved on 30-05-2022*):

Programme		Open 40.5%	Open-PwD	SC 15%	SC-PwD	ST 7.5%	ST-PwD	OBC-NCL 27%	OBC-NCL-PwD	Gen-EWS 10%	Gen-EWS-PwD	Total (including Female Supernumerary)	Total PwD* 5%	Seat Capacity	Female Supernumerary	Total Branch Capacity	Foreign Nationals Supernumerary 10%
Civil Engineering	Gender Neutral	16	0	5	1	3	0	9	1	4	0	39	2	45	4	49	5
	Female	3	1	1	0	1	0	3	0	1	0	10 (including "4" Supernumerary)	1				
Computer Science and Engineering	Gender Neutral	23	0	8	1	4	0	14	1	5	1	57	3	64	6	70	6
	Female	4	1	2	0	1	0	4	0	1	0	13 (including "6" Supernumerary)	1				
Electrical Engineering	Gender Neutral	22	0	8	0	4	1	14	1	5	1	56	3	67	3	70	7
	Female	5	1	2	0	1	0	4	0	1	0	14 (including "3" Supernumerary)	1				
Engineering Physics	Gender Neutral	8	1	3	0	2	0	6	0	2	0	22	1	28	0	28	3
	Female	2	0	1	0	0	0	2	0	1	0	6 (including "0" Supernumerary)	0				
Mechanical Engineering	Gender Neutral	19	0	7	1	3	0	11	1	4	0	46	2	52	6	58	6
	Female	4	1	2	0	1	0	3	0	1	0	12 (including "6" Supernumerary)	1				
Data Science and Engineering	Gender Neutral	10	1	4	0	2	0	7	0	2	0	26	1	33	0	33	3
	Female	2	0	1	0	1	0	2	0	1	0	7 (including "0" Supernumerary)	0				
B.Tech.-M.Tech. Integrated Dual Degree in Bio-Engineering	Gender Neutral	8	1	3	0	2	0	6	0	2	0	22	1	28	0	28	3
	Female	2	0	1	0	0	0	2	0	1	0	6 (including "0" Supernumerary)	0				
Total		128	7	48	3	25	1	87	4	31	2	336	17	317	19	336	33
		135		51		26		91		33							

*PwD reservations @ 5% will be horizontal (i.e., PwD candidates will consume seats from their birth category quota).

Seat Matrix for MBA programme for AY 2022-23 (Approved on 20-06-2022)

Program	Intake	UR	EWS	OBC (NCL)	SC	ST	PD*	Foreign Nationals (Supernumerary)
		40.50%	10%	27%	15%	7.50%	5%	5%
MBA in Data Science and Artificial Intelligence	80	32	8	22	12	6	4	4

**PD reservations @ 5% will be horizontal (i.e., PD candidates will consume seats from their birth category quota).*

Revised Seat Matrix for PG programme for AY 2022-23 (Approved on 06-09-2022):

Program	Intake	UR	EWS	OBC (NCL)	SC	ST	PD*	Foreign Nationals
		40.50%	10%	27%	15%	7.50%	5%	5%
M.Sc. (Chemistry)	50	20	5	14	7	4	3	3
M.Sc. (Physics)	40	16	4	11	6	3	2	2
M.Sc. (Applied Mathematics)	50	20	5	14	7	4	3	3
M.Tech (MES)	9	4	1	2	1	1	0	0
M.Tech (MEE)	10	4	1	3	1	1	1	1
M.Tech (FTE)	10	4	1	2	2	1	1	1
M.Tech (SE)	17	7	2	4	3	1	1	1
M.Tech (CSE)	17	7	2	5	2	1	1	1
M.Tech (PED)	18	7	2	5	3	1	1	1
M.Tech (VLSI)	33	13	3	9	5	3	2	2
M.Tech (CSP)	26	10	3	7	4	2	1	1
M.Tech (ET)	21	9	2	6	3	1	1	1
M.Tech (Bio-Tech)	26	11	2	7	4	2	1	1
M.A.	19	8	2	5	3	1	1	1
I-Ph.D.	9	4	1	2	1	1	0	0
IKSMHA Centre (Ph.D./M.Tech (by Research))	30	12	3	8	5	2	1	1
Total	385	144	39	104	57	29	20	20

**PD reservations @ 5% will be horizontal (i.e., PD candidates will consume seats from their birth category quota).*

Revised Seat Matrix for M.Tech. (by Research)/Ph.D. for AY 2022-23 (Approved on 06-09-2022):

Program	Intake	Open	Gen-EWS	OBC (NCL)	SC	ST	PD*	Foreign Nationals
		40.50%	10%	27%	15%	7.50%	5%	10%
M.S. (M.Tech by Research) SCEE	20	8	2	5	3	2	1	2
M.S. (M.Tech by Research) SE	25	10	2	7	4	2	1	3

Ph.D. SCEE	25	10	3	6	4	2	1	2
Ph.D. SE	65	26	7	18	10	4	3	6
Ph.D. SBS	100	41	10	27	14	8	5	10
Ph.D. SHSS	30	12	3	8	5	2	2	3
Total	265	107	27	71	40	20	13	26

**PD reservations @ 5% will be horizontal (i.e., PD candidates will consume seats from their birth category quota).*

PART – ‘B’

Item No. 36.9: Issues to be discussed by the Senate without Student Members being present.

-None-

ANNEXURE - A

1. Introduction of new award 'Institute Gold Medal' for the student earning highest CGPA among all the postgraduate students (M.Sc., M.A., M.Tech). Students who are the best performer in their respective programs would be awarded 'Institute Silver Medal'.
2. The PG students who have converted their program to PhD program will also be eligible for the Institute Gold Medal and Institute Silver medal, subjected to the fulfillment of all the requirement of the master program, they were enrolled in. However the medals to these students would be awarded only at the completion of their Master + PhD degree.
3. The Integrated PhD students, who do their course work along with the Master students would also be eligible for the Institute Gold Medal and Institute Silver medal. However, these students would be competing with master students, and only one award/medal would be given to the MSc and Integrated PhD students of the same batch.
4. "The President of India Gold Medal' would be given for the B.Tech students earning highest CGPA across all the branches. The students enrolled in the 5 year B.Tech + M.Tech Program or the BS+ MS program will also be eligible to complete for the award. For such cases student enrolled in the integrated program in 'y' year will complete with the B.Tech students enrolled in 'y+1' year. Students who are the best performer in their respective branch will be awarded 'Institute Silver Medal'.
5. The above mentioned awards are based on the academic performance in terms of the highest CGPA obtained. However if two or more students are having CGPA within a difference of 0.2 from the highest CGPA, student's performance in the extracurricular activity would be considered for deciding the medal awardee.

Centre for Robotics and Artificial Intelligence (CRAI)

Introduction

For several decades, the development of intelligent machines that help humans in various tasks has been a mainstay in science fiction. Many aspects of science fiction have been accelerating to science fact. Powering this change are recent developments in artificial intelligence, robotics and drone technology. In recent years, these fields have exploded into fast-paced research fields, and their applications are significantly transforming day-to-day life. A myriad of applications ranging from healthcare to autonomous vehicles has been powered by AI and associated algorithms. To address the technological advancements and their potential to vitalize the economy and the quality of life, the Indian Institute of Technology Mandi (IIT Mandi) conducted a Workshop on Healthcare Robotics and Drone Applications (WHRDA) between 27th and 29th May, 2022. The workshop was widely attended by renowned researchers in the field of Robotics, Artificial Intelligence (AI), and Drone Technology from India and abroad. Also, 20+ faculty and staff from IIT Mandi participated in this Workshop. As a part of the deliberations that took place in the Workshop, several topics emerged under three main themes: a) Robotics, b) Artificial Intelligence, and c) Drone Technology. To mention a few are: AI based robotics, Medical/Healthcare robotics, Haptics and Teleoperation robotics, Systems for AI, Neuroscience and Cognitive science, and applications related to drone technology, etc.

Consequent to the WHRDA Workshop, it is proposed to establish a **Centre for Robotics and Artificial Intelligence** (referred to as "CRAI") at IIT Mandi. IIT Mandi being situated in the foothills of Himalayas presents a unique opportunity to develop and test Robotics & Drone technology in the most challenging geography of the world. Seeing difficult terrain and geography at high altitudes, advanced UAV-based technologies can be a boon for the purpose of health, safety and rescue missions in case of natural calamities and unfortunate accidents. The CRAI will focus on research on topics concerning Robotics, AI, and Drone technology, which has several benefits such as: developing systems that complement and augment human capabilities, with an increasing focus on the future of work, understanding and addressing the ethical, legal, and societal implications of this research, creating robust and trustworthy robotics and AI systems, supporting the development of related technical standards and tools, better understand the national R&D workforce needs, and enable long-term investments in these research areas.

Objectives

The Centre's primary objectives are:

- To be a leading centre for robotics and AI research in the country, with visible recognition in terms of projects and developing systems useful to society at large.
- To contribute to core research aspects in robotics, AI, and drone technology.
- To seamlessly integrate with robotics and drone technology to provide AI-based solutions for sensing, learning, and inference.
- To provide a stimulating environment to the students, researchers, visitors, and faculty members to carry out world-class research, teaching, and product development in a team, so that the technology can be brought to the household level and reach the needy people who are economically challenged.
- To train the next generation of students and practitioners of robotics, AI, and drone technology.

- Bridge gap between industry needs and available skills through industry oriented learning- Develop certificate programs for people in industry for hands-on training in the field.

Figure 1 shows the components of the research areas under the proposed Centre. The centre is intended to be designed under three main themes: (a) Robotics, (b) Artificial Intelligence, and (c) Drone Technology.

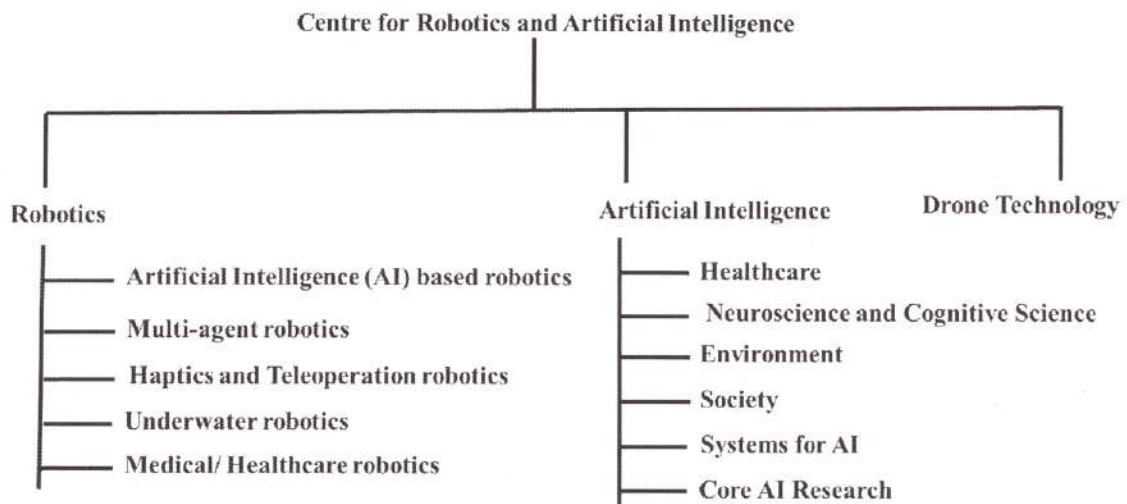


Fig. 1: The conceptualization of the centre is grounded in robotics, artificial intelligence, and drone technology.

Uniqueness

Some of the unique aspects where the proposed centre would focus on are:

- Significantly enable the development of robotics, AI, and drone technology-based solutions for societal benefits, and collaborate with partners (e.g. Industry, defense, hospitals, education, environment, etc.) to translate the research coming out of the centre.
- Introduce new undergraduate and postgraduate specializations in robotics, AI, and drone technology, and create dedicated facilities and labs for such program
- Develop AI and robotics-based frameworks for contributing to some fundamental research areas such as neuroscience, cognitive science, biological sciences, and environmental science which are considered important in the coming decades.
- Making robotics, AI, and drone technology platforms scalable, efficient and easily upgradable, and compatible across system architectures and OS and library upgrades
- Robotics, AI, and drone technology deployment for low-resource environments (e.g. mobile phones and other edge devices), and enabling mixed cloud-edge applications.

Research and Labs

The Centre would establish research labs like: AI-based robotics lab, Multi-Agent robotics lab, Haptics and Teleoperation lab, Underwater robotics lab, Medical/Healthcare robotics lab, Indoor Drone testing facility, Outdoor/Field robotics lab, AI lab, Tinkering lab, and teaching labs. The Centre would also cater to a

number of degree programs at the undergraduate and postgraduate levels. These programs include B. Tech. (Minor) in Robotics and the Master's degree program in Robotics and AI. The Centre will also include a Ph.D. program in Robotics and AI areas with Postdocs pursuing advanced research. The teaching programs would be supported via a number of teaching labs.

Deliverables

The CRAI plans to have several deliverables/outcomes that are going to be beneficial to society. Some of the outcomes are detailed below:

- High-quality research that evaluates the efficacy of CRAI among academia, industry, and research fraternities.
- Skill development activities produce next-generation CRAI researchers, which include undergraduate students, postgraduate students, doctoral, postdoctoral, and faculty.
- State-of-the-art facility for research in areas of Robotics, AI, and Drone Technology in India, which can be leased by other researchers and labs in India and abroad for research.
- State-of-the-art Centre, which provides a bouquet of technological developments and know-how for improving healthcare and other facets of society. This Centre could be utilized by both national and international visitors, who would like to experience, learn, and work on several research areas of CRAI in the pristine Himalayan environment.

Collaborations

Some of the Academic institutes and Industries in India and abroad with whom CRAI will collaborate include:

Industry:

Samsung
Gail India
Reliance
ABB
DEWA
ADNOC
HCL Technologies
TCS Research

Academia:

IISC
IIT Kanpur
IIT Delhi
IIT Palakkad
IIT Ropar
IIT Jodhpur
IIT KGP
IIIT Hyderabad
Stanford
CMU
ETH Zurich
KU
Queen Mary University, London
Royal Institute of Technology KTH Stockh
University of Pittsburgh
PGIMER Chandigarh
AIIMS Bilaspur
AIIMS Delhi