



భారతీయ సాంకేతిక విజ్ఞాన సంస్థ హైదరాబాద్
भारतीय प्रौद्योगिकी संस्थान हैदराबाद
Indian Institute of Technology Hyderabad

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आज़ादी का
अमृत महोत्सव

Annual Report 2022-23



**Inventing and Innovating in Technology
for Humanity
(IITH)**

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Research is creating new Knowledge - Neil Armstrong



Board of Governors



Chairman
Dr B V R Mohan Reddy
Founder Chairman and
Board Member of
Cyient Limited



Member
Shri Rakesh Ranjan, (IAS)
Additional Secretary (TE),
Ministry of Education,
Government of India



Ex-Officio Member
Prof B S Murty
Director
IIT Hyderabad



Member
Smt V Karuna, (IAS)
Secretary to Government, Higher
Education, Government of Telangana
State



Member
Prof Vinod Krishan
Senior Professor & Dean
Indian Institute of Astrophysics



Member, Senate Nominee
Prof Saptarshi Majumdar
Professor
Department of Chemical Eng
IIT Hyderabad



Member
Dr Prema Ramachandran
Director
Nutrition Foundation of India



Member, Senate Nominee
Prof Shiv Govind Singh
Professor
Department of Electrical Eng
IIT Hyderabad



Member
Prof M Lakshmi Kantam
Professor
Institute of Chemical Technology
Mumbai



Secretary
**Commodore Manohar
Nambiar (Retd)**
Registrar
IIT Hyderabad

Our Deans



Prof Saptarshi Majumdar
Dean (Academic)



Prof Tarun Kanti Panda
Dean (International Relations)



Prof Ranjith Ramadurai
Dean (Administration)



Prof K V L Subramaniam
Dean (Planning)



Dr Mudrika Khandelwal
Dean (Alumni & Corporate Relations)



Prof Chandrashekhar Sharma
Dean (Sponsored Research & Consultancy)



Prof Kanchana V
Dean (Faculty)



Prof Venkatasubbaiah K
Dean (Students)



Phanindra KBVN
Associate Dean (Planning)

Our Distinguished Professors



Dr Bayya Yegnanarayana
Professor, IIT Hyderabad,
Microsoft Chair, & INSA Senior
Scientist



Prof Chennupati Jagadish
Head of Semiconductor
Optoelectronics & Nanotechnology
group, Australian National University



Dr Rao Surampalli
President and CEO of Global
Institute for Energy, Environment
& Sustainability, Lenexa, Kansas



Prof Christopher C Berndt
Professor, Dept of Mechanical Eng &
Product Design Eng, Swinburne
University of Technology



Prof Jun Murai
Professor & Dean of Graduate
School of Media and Governance
Keio University, Japan



Dr Saraswat V K
Member - NITI Ayog



Prof J N Reddy
Professor, Mechanical Engineering
Texas A&M University



Prof Nobuhiro Tsuji
Graduate School of Engineering
Kyoto University



Prof Seeram Ramakrishna
Mechanical Engineering, National
University of Singapore



Dr Pulickel M Ajayan
Benjamin M & Mary Greenwood
Anderson Professor of Eng
Rice University, USA



Dr Paresk Kumar Narayan
Professor,
Monash Business School
Monash University, Australia



Dr Vidyasagar M
SERB - National Science Chair,
India



Prof Rohini M Godbole
Professor
IISc Bangalore



Prof Rao R Tummala
Distinguished & an Endowed Chair
Professor, Georgia Institute of
Technology, Atlanta, Ga, USA



Prof Vijay P Singh
Regents Professor
Texas A&M University, USA

Director's Message



Dear Friends,

As we submit the Annual Report for 2022-23, it is with immense pleasure that I take this opportunity to reflect upon the extraordinary achievements and progress witnessed at the Indian Institute of Technology Hyderabad (IITH) over the past year. The dedication of our remarkable faculty, excellent staff and brilliant students has been a driving force behind our success, and I extend my heartfelt gratitude to each member for their unwavering commitment and hard work.

IITH's Attainments:

In our fifteenth year, known as the Crystal year, IITH has achieved significant milestones. Retaining our overall NIRF Ranking at 14 and securing the 14th Rank in Research in the country is a testament to our consistent excellence. Maintaining our status within the Top 10 ranks of NIRF among technical institutes for the eighth consecutive year, with a current Rank of 8, reinforces our position as the premier second-generation IIT. Notably, our remarkable position of 3rd Rank in the NIRF Innovation Rankings and the considerable progress in the QS-2023 subject rankings in Physics and Astronomy showcase our commitment to academic excellence. IITH has earned four ISO certifications, including ISO 9001:2015 for Providing Educational Services, ISO 14001:2015 for Greenery and Environmental Promotional Activities, ISO 50001:2018 for Energy Saving Practices, and ISO 27001:2013 for Data Security Services. Additionally, we received ISO 22000:2018 certification for Food Safety Management Systems in the IITH Mess. This recognition underscores our commitment to quality across various facets of our institution. The placement scenario at IITH remains robust, with over 500 placement offers from 140+ companies during Phase 1 of campus placements this season.

Academics @IITH:

IITH is committed to pushing the boundaries of education and providing freedom and flexibility to students. Our diverse range of academic initiatives empowers learners to explore new frontiers, engage in cutting-edge research, and embrace interdisciplinary approaches. Collaborations with esteemed institutions have resulted in the introduction of programs such as MTech in Medical Device Innovation, MTech in Ophthalmic Engineering, and an MSc Program in Medical Physics. To contribute to the Indian Semiconductor Mission, IITH has launched a unique BTech program in IC Design and Technology and MTech programs in Systems Packaging, Semiconducting Materials and Devices and Quantum & Solid State Devices. These additions complement our existing MTech programs in areas like E-Waste management, Integrated Sensor systems, EV Technology, Microelectronics and VLSI, creating a strong ecosystem in the field of Semiconductors. Various initiatives, including a Dual Degree program for BTech students, an MTech in Techno-Entrepreneurship, and a Certificate Course on Deeptech Entrepreneurship, emphasize our commitment to fostering an entrepreneurial ecosystem.

Research, Innovations & Entrepreneurship @IITH:

Our robust framework for research and innovation has led to significant accomplishments. The research base at IITH boasts 9200+ research publications, 1,35,000+ citations, and approximately Rs 900 Crore of sanctioned research funding. Notably, our researchers have taken an early lead in 6G research and have developed affordable Ultra-High Performance Fiber Reinforced Concrete (UHPFRC) for infrastructural applications. IITH's participation in InvenTiv, a mega R&D Fair, showcased six industry-ready technologies, while collaborations with organizations like SMC Japan, MSIL, and others are paving the way for India-specific innovations in V2X communications. Our 5G Tech: NB-IoT System-on-Chip (SoC) is a unique innovation in the field. The entrepreneurial ecosystem at IITH has supported 130+ startups, creating 1000+ jobs and generating revenue exceeding Rs 1200 Crore. Notably, the Acclimatization Boot Camp (ABC) for Defense Startups, launched by Hon'ble Defense Minister Shri Rajnath Singh, underscores our commitment to supporting innovative ventures.

Collaborations & Relations Building:

IITH's collaborative partnerships with industry and institutions have strengthened, resulting in impactful interdisciplinary research projects. Agreements with CSIR NEIST Assam, Commissionerate of Collegiate Education, Govt of Telangana, Kathmandu University, Nepal, CMOS - College of Medical Sciences, Nepal, IIIT Hyderabad, and others reflect our commitment to collaborative growth. MoUs with DRDO, Suzuki Motor Corporation, TCS, Hexagon, NCAM, Auckland University of Technology, Greenko, NHAI, and Beyond Next Ventures India Pvt Ltd (BNVI) further highlight our dedication to fostering innovation through collaboration. The adoption of five villages in our vicinity, with faculty, staff, and students providing voluntary support, exemplifies our commitment to community engagement.

Awards & Recognitions:

The recognition of 17 faculty and 1 PhD scholar from IITH among the Top 2% of Scientists by Stanford University is a testament to our faculty's excellence. Numerous awards and fellowships received by our faculty and researchers, including the INSA Young Scientist Award and "THE Award for International Collaboration of the Year 2022," underscore our commitment to academic and research excellence. Our students, too, have showcased outstanding performances at various forums, receiving accolades such as the Stephen Mitchell Award, winning hackathons, and earning recognition on international platforms.

Alumni:

IITH alumni continue to excel across various domains, making a remarkable impact on the academic realm. Many alumni have assumed faculty positions at prestigious institutes, including IITs, IIMs, and NITs, demonstrating the quality of education and training at IITH. The first batch of graduates from IITH celebrated a decennial year in 2022. Their batch started the legacy of contributing to a common cause for the development of their Alma mater. This class of 2012 has created a lawn tennis court on campus.

Campus Infrastructure:

With cutting-edge facilities, modern classrooms, well-equipped laboratories, and collaborative spaces, IITH offers a vibrant ecosystem fostering creativity and intellectual exploration. Our recent additions, including the DST-IITH, Integrated Clean Energy Material Platform (ICMAP) for Bioenergy and Hydrogen, 5G Testbed, and a demonstration-purpose Scanning Electron Microscope, reflect our commitment to providing state-of-the-art infrastructure.

The establishment of the Raindrop Research Facility (RRF), the Advanced Darksky Observatory, and collaborations with Malla Reddy Narayana Hospitals (MRNH), ICICI Bank Limited, and others further enhance our research and development capabilities. Special moments include the laying of the Foundation Stone for BVR Mohan Reddy School of Innovation & Entrepreneurship, the inauguration of the TiHAN Testbed for Autonomous Navigation, and the inauguration of the Chemistry Department Building. The completion of our Sports & Cultural Complex SNCC, with state-of-the-art facilities, promises to be a central hub for holistic development at IITH, fostering talent, community, and the overall spirit of our institution.

Cheerful Moments @IITH:

From celebrating our 14th Foundation Day with Mr Senapathy "Kris" Gopalakrishnan as the Chief Guest to hosting events like the research excellence awards ceremony, "JAPAN DAY" job fair, MILAN 2022 Championship, Elan & ηVision-2023, E-Summit 2K22, and the Milan Championship, IITH has been vibrant with energy and excitement.

Conclusion:

As we look ahead, optimism and enthusiasm fill our hearts. Our commitment to excellence, innovation, and societal impact remains unwavering. In the coming year, we will continue to embrace change, seize opportunities, and pioneer new frontiers in education, research, and community engagement.

I invite you to explore the detailed insights provided in the following pages of our Annual Report. It is a testimony to the collective efforts of our dedicated team, and I encourage you to share in our pride.

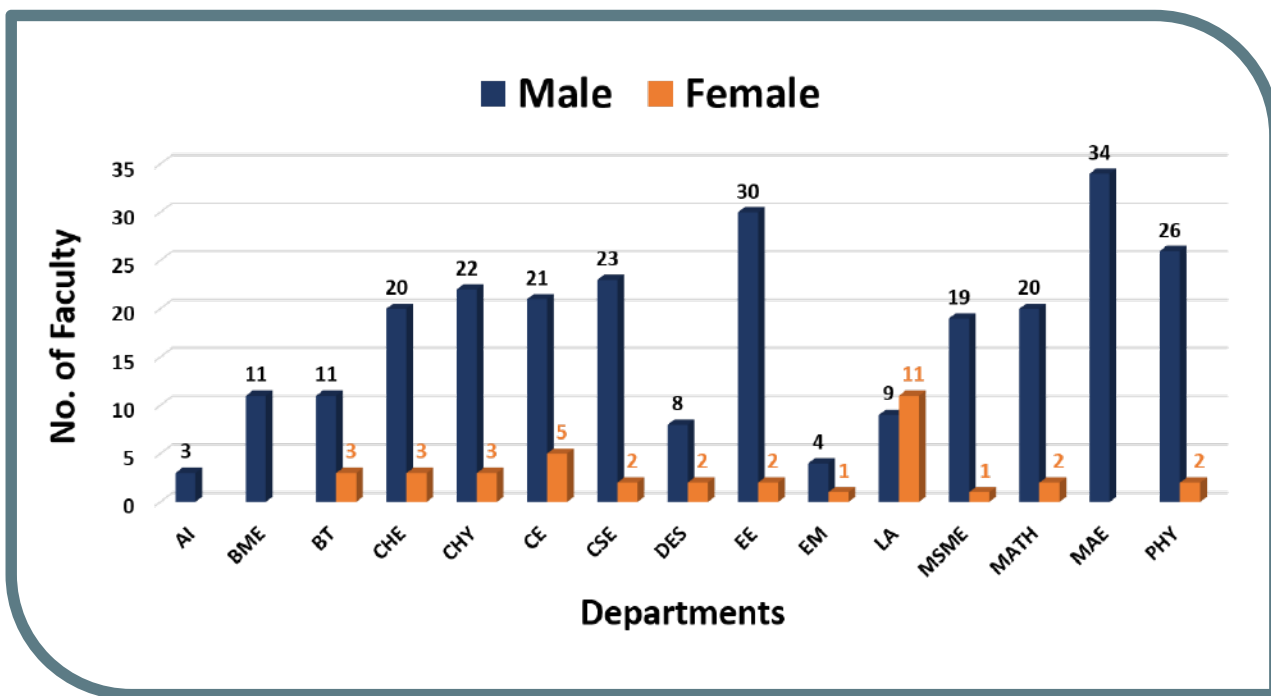
Thank you for your continued support as we strive for excellence and make a positive difference in the world.

Best Regards,
Prof B S Murty

Faculty Statistics

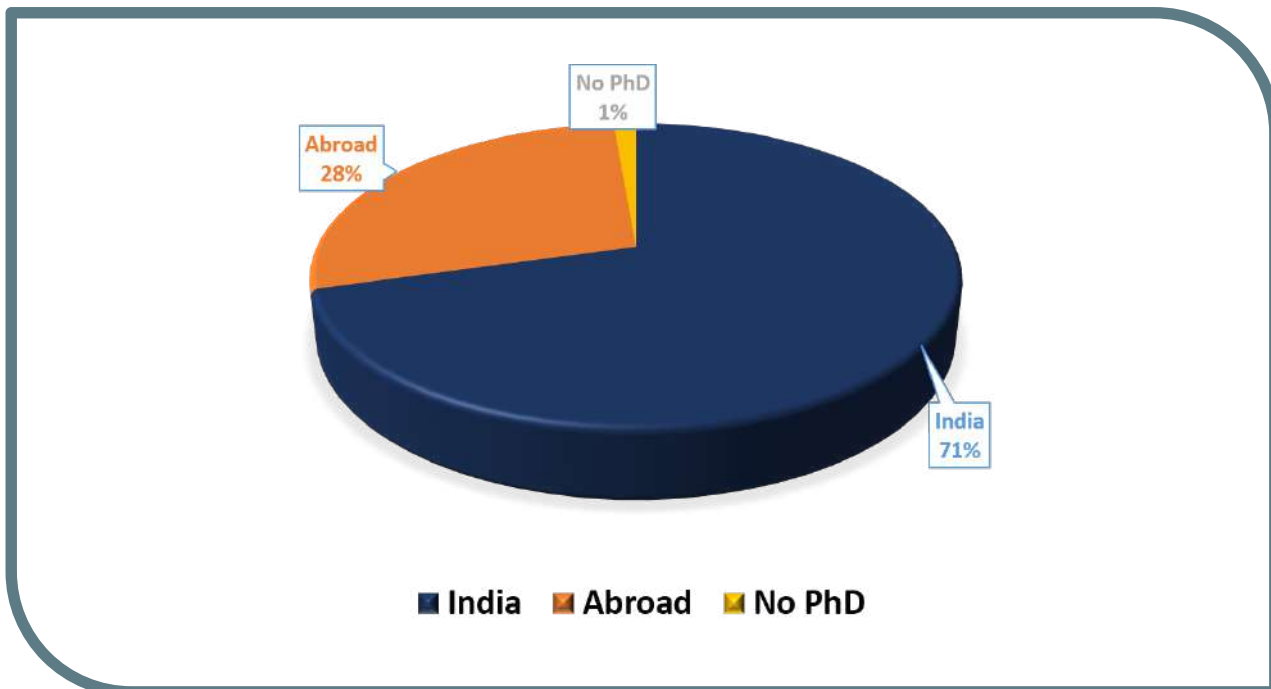
Department-wise

As on 31 March 2023, IITH is having 299 faculty members on-roll. ~14% of the total faculty are women.



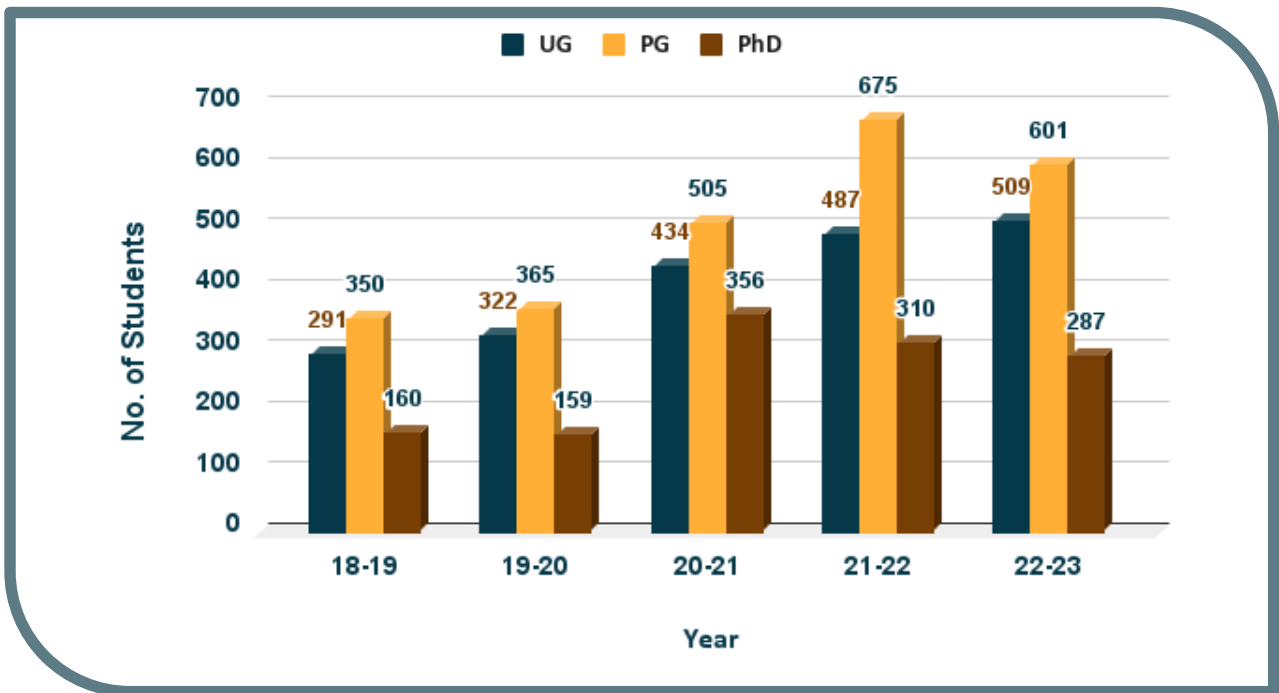
Place of PhD

Place of PhD denotes the geographical location (India/ Abroad) of the Institute from where the concerned faculty has obtained PhD.

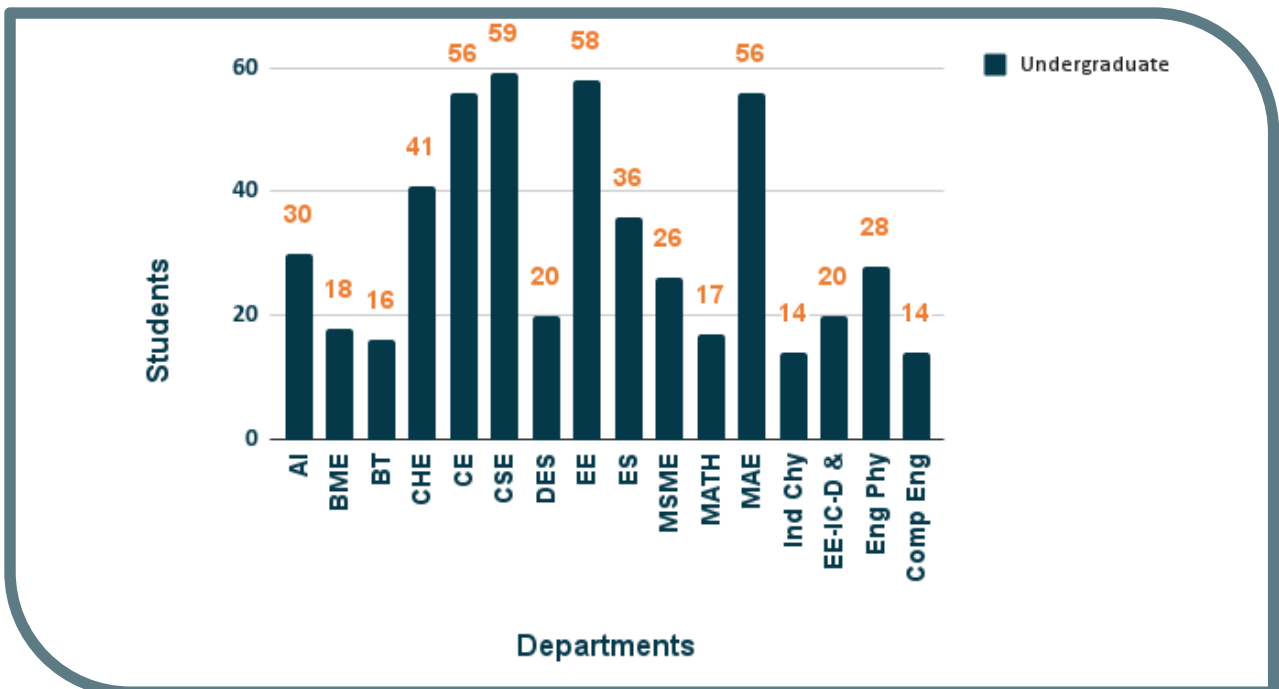


Student Statistics

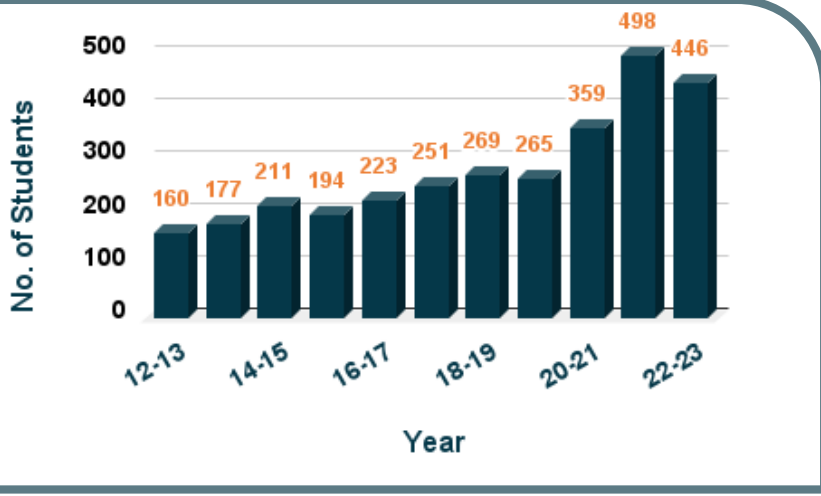
While maintaining the dynamic students among UG, PG and PhD, IITH has seen an increase of 22 seats in UG programs for the AY 2022-2023.



The summary of annual intake for various courses

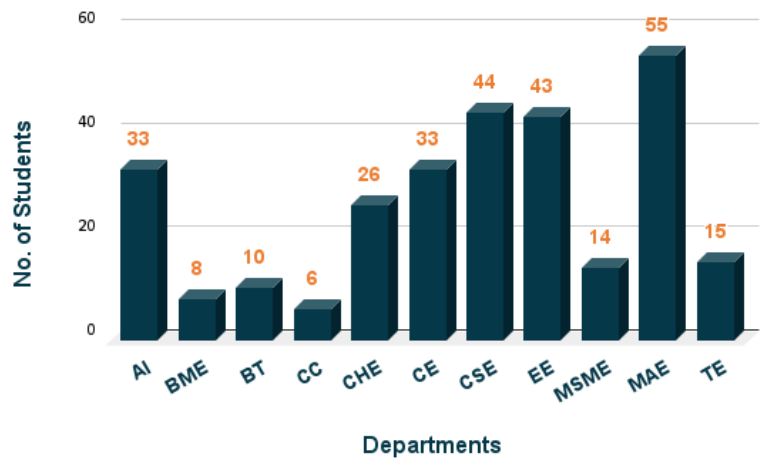


Department-wise Distribution of Undergraduate Students (BTech+BDes) for 2022-2023

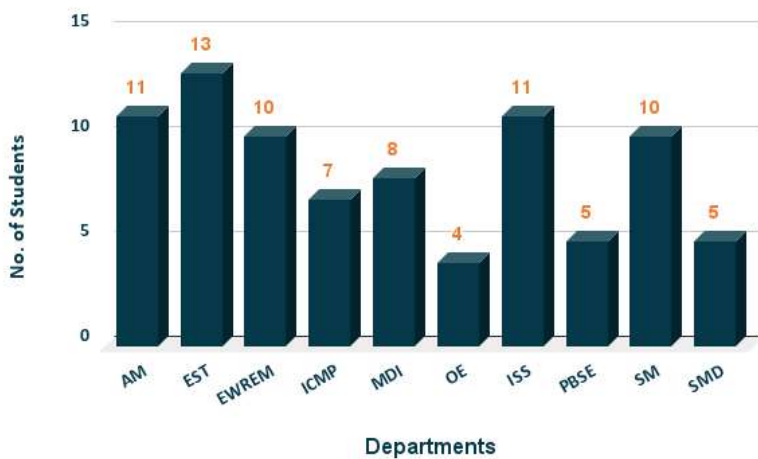


Yearly Intake of all M.Tech Students

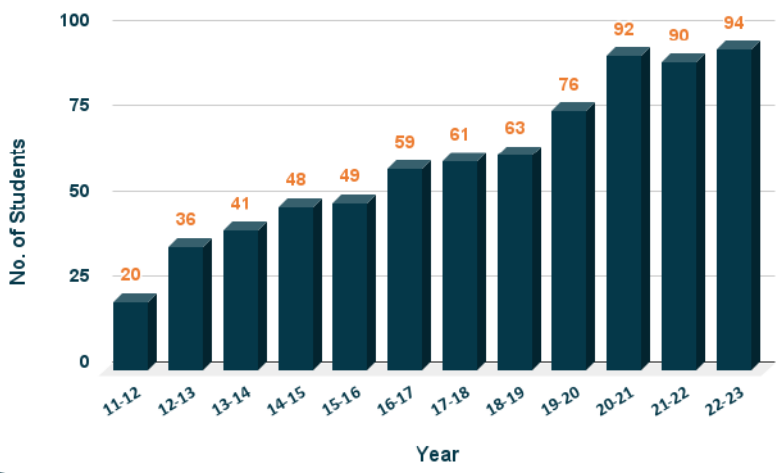
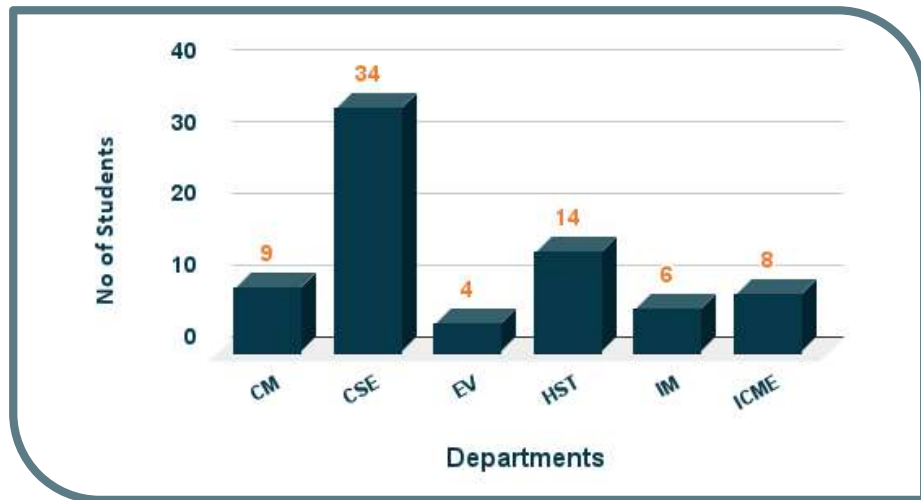
Department-wise Distribution of M.Tech Students for 2022-2023



Department-wise Distribution of M.Tech (Interdisciplinary) Students for 2022-23

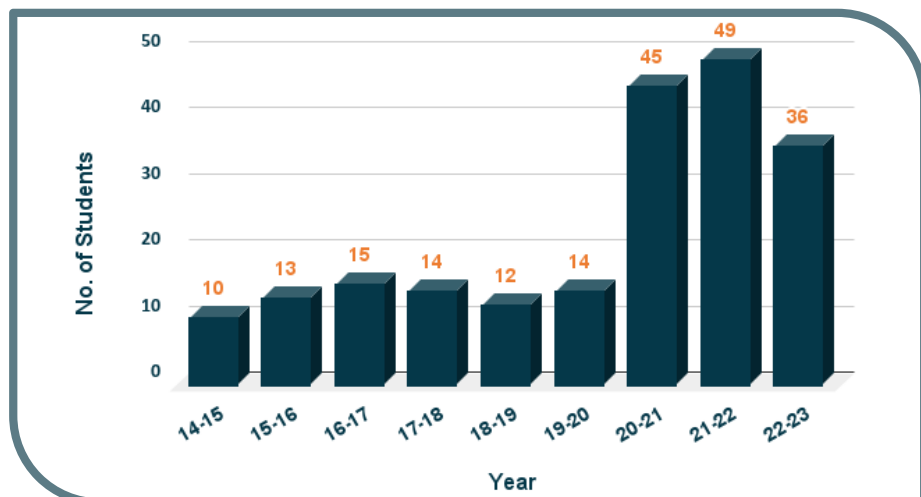


**Department-wise
Distribution of MTech
(Online) Students for
2021-22**

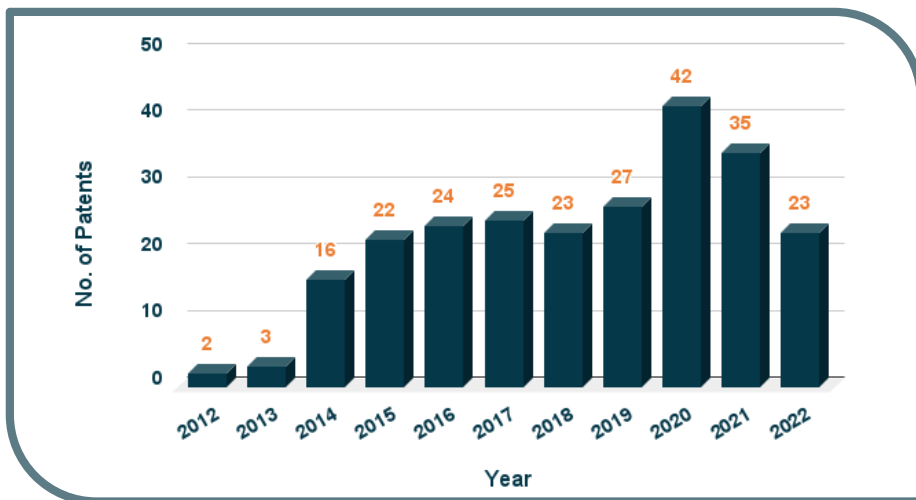


**Yearly Intake of MSc
Students**

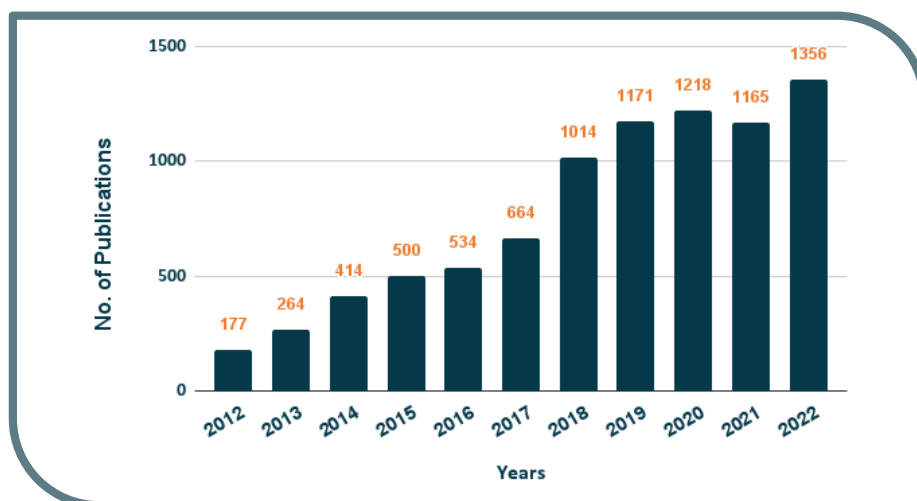
**Yearly Intake of
MDes Students**



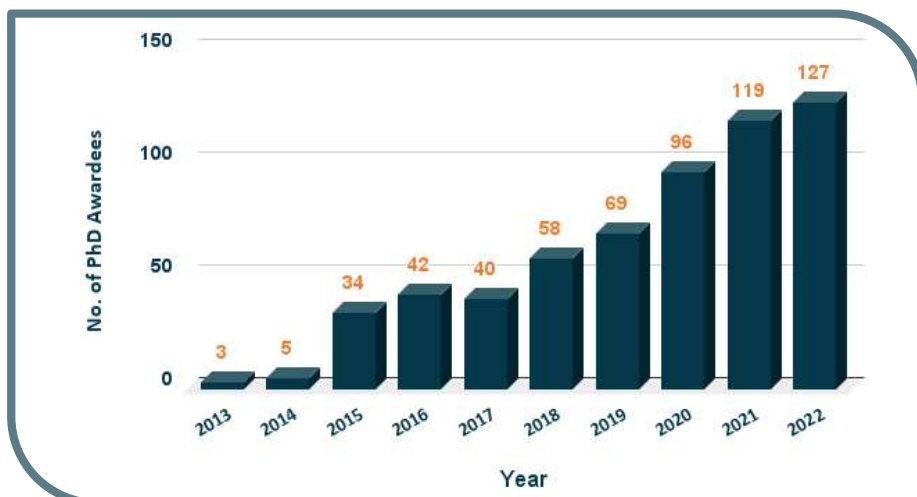
Patents, Publications & PhD



Year-wise
Distribution of
Patents filed

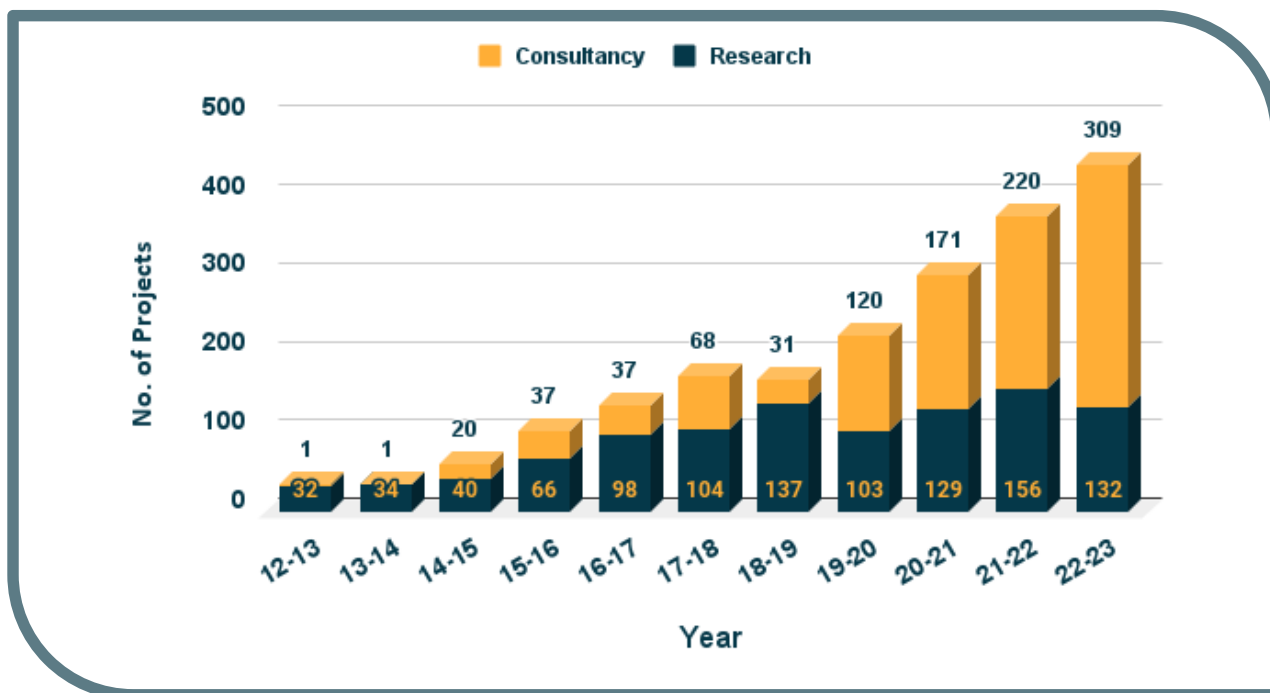


Year-wise
Distribution of
Publications

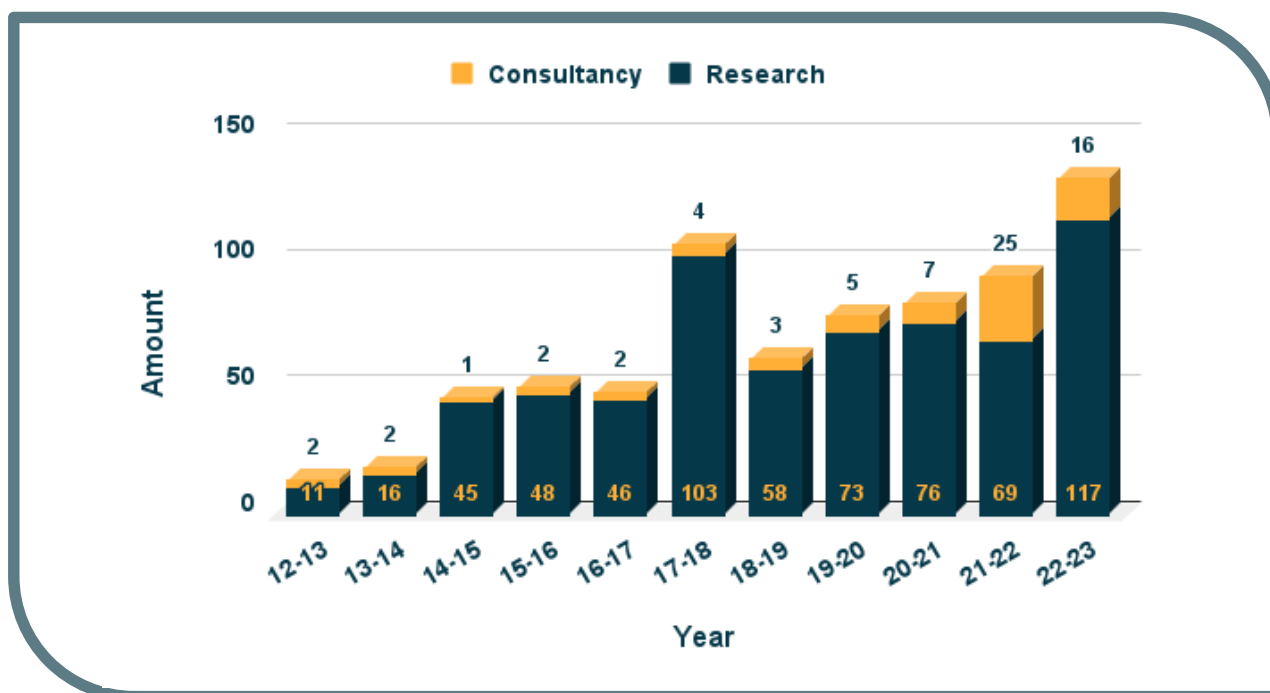


Year-wise
Distribution of
PhD Awarded

Research & Development



Year-wise distribution of No. of Projects



Year-wise distribution of Project Funds (Value in Cr {INR})

Placement & Internship

Webpage: <https://ocs.iith.ac.in/>

Placements

Job Offers

Placement Drive 2023 at IIT Hyderabad, which began on December 1, 2022, was conducted in hybrid mode. In 2023, there was a significant increase in International offers when compared to the previous years. Despite the recession, several core industries proactively participated and recruited a good number of students. Placements for this year highlight positive trends both in terms of the diversity of recruiters as well as the quality of profiles offered.

Key Highlights for the year 2022-2023

- Number of Companies Registered: **335**
- Total number of students: **845**
- Number of Students Registered for Placement: **762**
- Total offers Issued: **629**
- Number of Companies hired: **176**
- Highest Package: **₹ 63.78 Lakhs**
- Average Package: **₹ 20.07 Lakhs**
- Number of International offers: **55**

Top Paying Recruiters:



Higher Education

A good number of students from UG and PG opted for higher education in India and abroad. Mentioned below are the few universities opted by the students for higher education:

- California Institute of Technology
- Carnegie Mellon University
- Columbia University
- Georgetown University
- Georgia Institute of Technology
- Harvard Business School
- New York University
- University of Southern California
- Purdue University
- University of Illinois
- University of Pennsylvania
- University of Texas
- Karlsruhe Institute of Technology
- University of Minnesota Twin Cities
- University of Munster
- ISI
- IISc Bangalore
- IIT Delhi
- IIT Madras
- IIM Ahmedabad
- IIT Bombay

Internships

IIT Hyderabad is continuously working towards industry engagement. Semester-long Internships for BTech & BDes, Interdisciplinary MTech, Industry lectures, industry defined MTech projects are some of the key initiatives taken in this direction in recent years. IITH witnessed a significant increase in the number of National and International internship offers for the AY 2022-23. A total of 255 offers were received from 83 companies, out of which 08 are international from 05 Japanese Companies. The participating companies are from diversified sectors such as IT, Financial Services, E-Commerce, Manufacturing, Consulting, Construction, Healthcare Services, Auto Retail, R&D, etc.

Highlights for the year 2022-23:

- Number of companies registered: **194**
- Companies hired: **83**
- Total Internship Offers: **255**
- Summer Internship offers: **180**
- Semester-long Internship offers: **72**
- Highest monthly stipend: **₹ 2 Lakhs**
- Average monthly stipend: **₹ 70,700/-**
- Internship offers of 2020-21 converted to PPOs: **104**

Top Hirers for the year 2022-23:



Incubation Centres

CfHE - Centre for Healthcare Entrepreneurship

Webpage: <https://cfhe.iith.ac.in/>

CfHE is a Section 8 company established at IIT Hyderabad with Section 12 A, 80G and CSR Registrations. CfHE is also a recognised Technology Business Incubator (TBI) approved by DST and a BIONEST through BIRAC, DBT, Government of India. CfHE strives to bring affordable solutions that meet the healthcare needs of the country. CfHE achieves this through incubating companies engaged in innovative medical devices, medical services and other healthcare needs. These companies are incubated after a world-class one-year healthcare entrepreneurship education program, in which fellows undergo a structured bio-design thinking process, identify unmet clinical needs through clinical immersion at leading hospital partners in Hyderabad, innovate solutions and prototype them along with strong mentoring in setting up business, as well as regulatory practices.

The grand pitch of the 2021 batch:

The "Grand Pitch" for the Foundation for Center for Healthcare Entrepreneurship's sixth batch of fellows was conducted on November 5, 2022.

1. M/s Avinya Neuro Tech Pvt Ltd, founded by Mr Aniket Kumar & Ms Sai Soumya, is A smart wearable device to tackle Non-Convulsive Status Epilepticus condition in critical patients
2. M/s Kausthubha Med tech Pvt Ltd, founded by Dr Gurushankar, Smart Wearable Pregnancy Monitoring Device
3. M/s Vi hab Solutions Pvt Ltd, founded by Mr Arif Ali, is a Device for in-bed passive mobilization of bedridden patients
4. M/s Healthora Innovations Pvt Ltd, founded by Ms. Shalini Balgude, Device an Assistive mobility and rehabilitation device for pediatric patients with Cerebral Palsy

Medtech Symposium:

The third edition of the Med Tech Symposium was hosted on 11th & 12th March 2023 @ CfHE, IIT Hyderabad. Sessions are Govt Bodies, Regulatory Policies and funding Channels, Funding Perspectives: Public and Private Partners, Medtech Industry Industrial Collaboration with Early Startups, Incubation EcoSystem, Stakeholder Perspectives in Fellowship Program and Medical Device Innovation, Challenges and opportunities Startup Journey, Importance of Business model & Understanding the Market, Importance of Regulatory part, Funding.



Achievements:

1. M/s Heamac Health Pvt Ltd is Honored to present ITS innovation IIT 2022, and our Hon'ble Prime Minister, Shri Narendra Modi, appreciates the All IITs R & D Fair, where 75 promising innovations were demonstrated by the 23 IITs.
2. M/s Heamac Healthcare Pvt Ltd has been chosen as the winner of the Finale. HEAMAC will now represent TiE Hyderabad at the TiE_University Global Competition in the months of May and June in Silicon Valley.
3. M/s Jivika Healthcare Pvt Ltd received the NATHEALTH Healthcare CSR Award at the NATHEALTH Annual Summit 2023.

Product Deployment

Deployment of 3 IoT-enabled ICU ventilators in district hospital @Vizianagaram, A CSR initiative in partnership with Indian Oil Corporation Limited and Center for Healthcare Entrepreneurship, IIT Hyderabad.

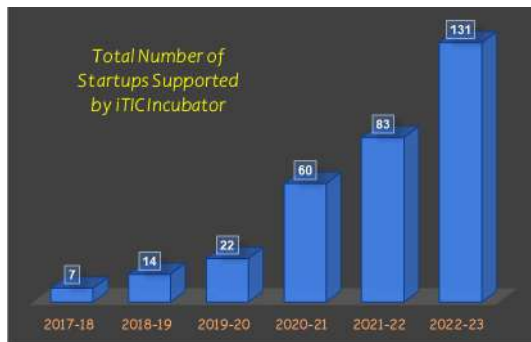
i-TIC - Technology Incubation Centre

Webpage: <https://itic.iith.ac.in/>

If iTIC can be seen as a startup incubator in the making, the year 2022-23 can be said to be its scaleup stage. The previous years have put the foundations in terms of structured programs, qualified and energetic teams, prototyping and other working facilities, and a policy framework. This year iTIC is able to extend this expertise to more and more entrepreneurs and startups. The following is a brief summary of the activities of iTIC this year.

Incubation:

The number of startups supported by iTIC has touched 130 this year. The histogram indicated this growth across the years. In this context, it is worth mentioning that this is accomplished by keeping a fair balance on hardware and software domains; 30% of these startups are hardware driven, while another 30% are software rooted and approx. 40% a hybrid mix of both.



Program	Status		As on 31st March, 2023
	Ongoing	Graduated	
Pre-Incubation	Ongoing	13	
	Graduated	31	
Incubation	Ongoing	17	
	Graduated	15	
Advanced Incubation	Ongoing	01	
	Graduated	00	
Acceleration	Ongoing	00	
	Graduated	32	
iDEX	Ongoing	24	
	Graduated	00	

NICE (with NMDC), TiHAN-iTIC (with TiHAN), NIDHI Prayas (of DST), Tide 2.0 (of Meity), and iDEX (with MoD) remain the prominent schemes for pre-incubation and incubation support. The table below indicates the stage-wise distribution of the startups supported by iTIC.

We have also expanded our footprint by conducting a significant number of focused workshops and events for a wider set of audience, the following being a few of them.

Skill Development Activities

- **Fabrication Factory Series:** To impart basic prototyping skills for founders and aspiring entrepreneurs, FFS was a 3-week long program conducted in June 2022.
- **TiHAN Innovation Accelerator:** Designed for researchers, academicians, and aspiring entrepreneurs, the program aims to enable them to convert their research into commercially viable products. It was conducted in May 2022.
- **Ottomomo'22 Challenge:** A grand challenge with TiHAN to source solutions to industry problems. The challenge ran from Feb - June 2022.
- **Deep Engagement Program:** iTIC in collaboration with SINE IIT Bombay under MeitY Startup Hub, organized Deep Engagement Program on March 15, 2023, that brought together 20 incubator representatives for a day-long event focused on establishing and sustaining successful incubator programs.
- **Mentor/Expert sessions:** A total of 35+ expert mentor sessions were arranged this year for startups. Few mentorship sessions were on a one-to-one basis whereas others were group mentoring.

Showcase and Exhibitions

- **Innovation Day at IIT Hyderabad 2023:** The Innovation Day event, held on January 7th, 2023, provided a unique opportunity for innovators to showcase their work and be recognized for their ideas and innovations.
- **Nidhi Prayas Cohort 1 Demo Day:** On August 17, 2022, iTIC organized Nidhi Prayas Cohort 1 Demo Day where the graduating startups showcased their prototypes in an open house format to the IITH fraternity.
- **DefExpo 2022:** The largest defence exhibition was held from Oct 18-22, 2022 at Gandhinagar Gujarat. The event saw the participation of 5 defense applications startups from iTIC.
- **E-Motor Show 2023:** The E-Motorshow 2023 was held at the HITEX Exhibition Centre in Hyderabad from February 8-10, 2023. This three-day event brought together startups, investors, designers, and entrepreneurs from various domains to showcase the latest developments in the electric vehicle (EV) industry. A total of 4 startups from the EV ecosystem participated in the exhibit.
- **Aero India 2023:** The Aero India Expo 2023 was held from February 13-17, 2023 at the Air Force Station, Yelahanka, Bengaluru. The event was a platform for innovators, startups, MSMEs, and conglomerates from the defense and aerospace industry to come together and showcase innovations. 6 startups from iTIC demonstrated their products.

Other Relevant Events:

Inauguration of TIP building: On July 2, 2022, the TIP building was inaugurated by the Hon'ble Minister of Education, Shri. Dharmendra Pradhan. The event included an exhibition and interaction of startups from the IITH ecosystem.

Semicon Roadshows: The Semicon Roadshow series is an initiative to sensitize engineering students and faculties towards opportunities in the electronics and semiconductor industry in India. A total of 6 roadshows were conducted pan India with the participation of 1000+ students and 80+ faculties.

Entrepreneur meet-ups: iTIC regularly organizes informal Entrepreneurs' meetings where founders from iTIC-associated startups network, share their learnings, make new connections, and have some fun. This year iTIC organized two such meetings on Apr 22 and Jan 23.

iTIC Foundation Day celebrations: The annual celebration took place at the TIP Building lawns on Oct 31, 2022, providing a platform for our startup founders, board members, and mentors to come together and network.

India Tech Startups Landscape Report 2022 - The Indian Tech Startup Landscape Report, created by Nasscom Zinnov, offers an in-depth analysis of the Indian Tech Startup Ecosystem, covering emerging trends and challenges. A debriefing session was hosted on March 23, 2023

Summary:

These activities and events have helped project iTIC as a mentor incubator in the ecosystem with an intent and capability to share and support these learnings with others and also lead programs involving multiple incubators. We hope that the coming years will see iTIC playing a crucial role in enhancing the innovation ecosystem and culture. Seeking the support and participation of all in that journey.

TiHAN

DST NM-ICPS Technology Innovation Hub on Autonomous Navigation

Webpage: <https://tihan.iith.ac.in/>

Major Activities at TiHAN during FY 2022-23

Testbed on Autonomous Navigations (Aerial/Terrestrial) at TiHAN, IIT Hyderabad:

Dr Jitendra Singh, the Minister of State for Science and Technology & Earth Sciences, inaugurated India's first Testbed for Autonomous Navigation at IIT Hyderabad on 4th July 2022. During the inauguration, he emphasized that the TiHAN Autonomous Navigation Testbed (Aerial & Terrestrial) will be the hub for cutting-edge solutions in safe, sustainable, and smart mobility. Singh stated, "This pioneering facility will spearhead the development of futuristic technology for autonomous vehicles, enabling precise testing of advanced navigation technologies, facilitating rapid technology advancement and global market expansion". The significant features of Testbed are 5G enabled, Edge Cloud, Drone Hanger Facility, Command Control Station, Weather Monitoring Station, Rainfall Simulator, Vehicle to Infrastructure (V2I) communications, Drone Landing Area, Pedestrian crossing, Smart poles, Roadside unit (RSU), Multilane Highway, T-Intersection, Signalized and Unsignalized Intersection, S-curve, Rigid Road, Dual Lane Road, open test area, etc. TiHAN Testbed has become the Platform for collaborative research on Next Gen Mobility for national and international levels of Academia, Industry, and R&D Labs. Various services for Autonomous Navigation-related Research and Development are Homologation, SoP, regulatory framework, etc., are provided using the Testbed's pricing model. <https://tihan.iith.ac.in/tihan-iith-testbed/>



TiHAN R&D Activities:

- **Autonomous Ground Vehicles (AGVs):** Data Collection for Autonomous Vehicles (AVs), Advanced Driver Assistance Systems (ADAS) Safety Standards, Development of multisensory fusion-based perception sensing system in progress, AEB and FCW Evaluation at TiHAN Testbed, Autonomous e-bike navigation Autonomous Navigation Humanoid, Map-based navigation of Autonomous Ground Vehicles (AGVs), Radar-based SLAM for autonomous vehicles, Oil and Gas Pipeline Inspections using UAVs and UGVs, Off-Road Autonomous Vehicles, Mining Applications, etc.
- **Connected Autonomous Vehicles (CAVs):** V2X Communications for Autonomous Vehicles, Development of Pedestrian Detection System in VehicleInfrastructure (V2I) Communications, Emergency VehicleWarning System for Vehicle (V2V) Communications, Implementation of ForwardCollision Warning (FCW) System using V2X Technology for Autonomous Vehicles (AVs).

- **Autonomous Unmanned Aerial Vehicles (UAVs):** Bioinspired Micro UAVs for Surveillance, Nano (UAVs) for Energy Harvesting Applications, Command Control Station (CCS), State Estimation and path planning of Autonomous Vehicles (AVs), Geofencing of Unmanned Aerial Vehicles, Marker Based Landing (MBL), Urban Air Mobility – Heavy payload drones, UAVs in GPS Denied Conditions, UAV Based Smart Agriculture, Anti-drone Detection and Neutralization, Swarm of UAVs etc.
- Autonomous Surface Vehicles (ASVs) and Underwater Navigation.

TiHAN Technology Products:

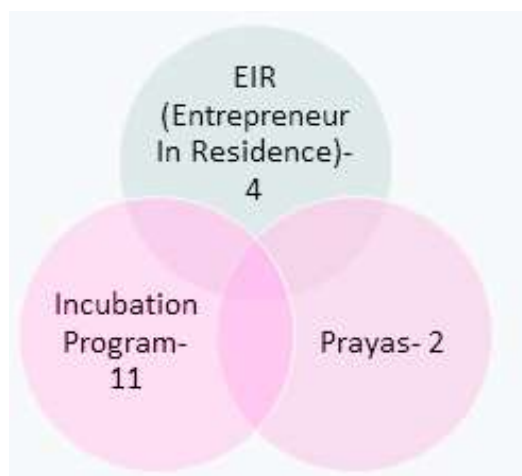
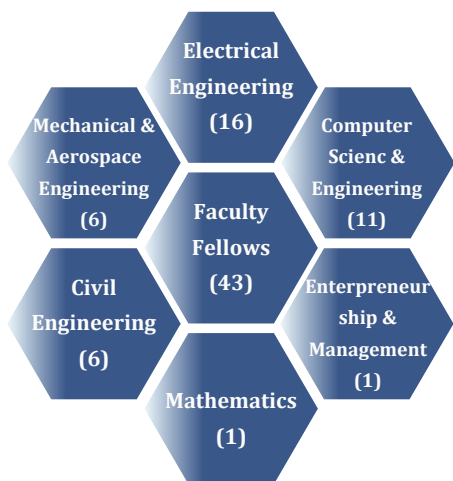
TiHAN focuses on the technologies related to Autonomous Navigation, mainly UAV and UGV. To date, TiHAN has developed 35 technology products, including UAV with high-end sensors- Lidar/HSI, Driving Under Influence Simulator, Inhouse developed UGV and UAV kits, Development of Lane Departure Warning System (LDWS) for SAE Level 3 Vehicles, Autonomous/Remote Operated Surfboard, etc.

Research and Development, Human Resource & Skill Development:

R&D Collaborators: TiHAN has extensive research collaborations with diverse national and international industries, including SMC Japan, ARAI, TTL, LTTS, ICAT, NATRAX, Reliance Industries, etc. By fostering a robust R&D portfolio within the hub and promoting commercially viable translational research, TiHAN and its partner institutes aim to strengthen consultations and discussions to explore lucrative business prospects in the field of Autonomous Navigation. There are Joint R&D initiatives on a cost-sharing basis, Consultancy projects with both Govt. and Private entities. Also identified Areas of Collaboration with various Industries (some NDA signed, Project Agreement going on) – Suzuki Motor Corporation sent vehicles from Japan for R&D on ADAS for the Indian scenario and testing in the TiHAN testbed.

There are 43 Faculty from different Departments of IITH, other Faculty from R&d Collaborators, and 10 Faculty Fellowships.

Startups: TiHAN is funding 17 startups under different schemes such as EiR, Prayas, and Incubation Programs.



TiHAN Achievements:

- **G20 Host Institute – TiHAN Autonomous Navigation Technology Demonstration:** Representatives from the G20 Second Meeting of the Digital Economy Working Group Visited IIT, Hyderabad. India's remarkable advancements in 5G, IoT, 6G System Prototypes, and Autonomous Navigation (TiHAN-IIT Hyderabad).
- **SIRO Recognition by the Department of Scientific and Industrial Research (DSIR) from April 2023 to March 2026.**
- **Autonomous Navigating Humanoid with Spoken Hindi Application.**
- **TiHAN Foundation at IIT Hyderabad has launched a Data collection vehicle for autonomous Driving on Indian roads.**
- **Regulatory Framework and Safety Performance Testing of Autonomous Vehicles in Defined Operational Environments.**

TRP - Technology Research Park

Webpage: <https://trp.iith.ac.in/>

“IITH Technology Research Park” is an independent Section 8 Company founded, promoted, and hosted by IIT Hyderabad, governed by a Board of distinguished academicians, faculty of IIT Hyderabad, and industry professionals to inculcate the idea of innovative entrepreneurship in synergy with research and development.

During the Financial Year 2022 – 23, IITH Technology Research Park has provided space to 6 different entities ranging from private companies to Indian Defence Forces & Research Organizations.

Out of these 6, 4 were private companies who have established their R&D labs in the TRP building, and amongst them, one (1), namely, CBAI Pvt Limited, had graduated from i-TIC Foundation IIT Hyderabad, the Technology Business Incubator at IIT Hyderabad.

The rest of the companies are working in various sectors ranging from Software, drone technology, biomed / biotech, and pharmaceutical-related research activities.

Other than these, we are proud to host the Indian Navy’s R&D arm (WESEE) in the TRP building, which is collaborating with the IITH fraternity towards the development of products that are working towards “Make in India” & and “Atmanirbhar Bharat” goals of the Government of India.

We are also proud to host DRDO’s DIA CoE at IITH in the TRP building, which has begun interactions with various departments and faculties to develop niche technologies and products that would be beneficial in achieving the goals set by the Government of India to make and promote indigenous products and technology.



Team IITH with Team WESEE Indian Navy

Centre of Excellence

CCE - Center for Continued Education

Webpage: <https://cce.iith.ac.in/>

Overview: The Centre for Continuing Education (CCE) aims to conduct training programs for students, academicians, and working professionals across the country. The young and energetic faculty of IIT Hyderabad are dedicated towards providing learning opportunities for the professional growth of interested participants. With a rapid rise in E-learning programs, CCE @ IIT Hyderabad is keeping abreast with the online programs that can facilitate the learning of working professionals by meeting their work schedules.

Scope and functions:

- To conduct all academic outreach activities like Conferences, Workshops, Certificate Courses, Symposia, Short-term courses, Training programs, and other similar activities of the Institute under the umbrella of the CCE.
- To organize teacher training programs for faculty of engineering colleges.
- To provide necessary logistics and administrative support to run such programs.
- To evolve a mechanism for self-sustainability in the future.

CCE ACTIVITIES - April 2022-March 2023 (Including TLC, GIAN activities):

Description	Events		Number of Participants
	Number of TLC events	5	
Number of GIAN courses	2	84	
Direct CCE Events	24	1549	
Total Number of events	31	1936	



Conference on Commutative Algebra and Algebraic Geometry (CoCAAG 2023)



Visit by School Children



DST MANAK



DST MANAK



Talk on The Science & Art of Technical Paper Writing



Digital Fabrication Workshop

CIP - Centre for Interdisciplinary Program

Webpage: <https://cip.iith.ac.in/>

The Centre for Interdisciplinary Program (CIP) was created with a vision of fostering interdisciplinary studies across various disciplines at IIT Hyderabad. CIP @ IITH is envisioned to create new paradigms in education, integrating techniques, tools and science from multi and cross-disciplinary expertise on the IITH campus.

The CIP would be a cradle for 'SEEDING' new interdisciplinary Programs bringing together experts with common interests from various branches to address the ever-evolving needs of Science, Industry and humanity, thus shaping up new courses and unique Programs that never existed before and training human resources for tomorrow. These teams of interdisciplinary nature would act as epicentres for brainstorming and writing new grants that would emerge into new Centres of Excellence of National Importance. IITH has formalized 09 interdisciplinary (ID) regular MTech and 02 online MTech programs, 01 BTech program in Computational Engineering, 01 MSc Program in Medical Physics and ID and joint PhD programs.

Admissions:

The admission details for the Academic year 2022-23 are as follows: 25 students joined for the 4-year BTech (Computational Engineering), 73 Students for the 2-year MTech, 3 Students for the 3-Year MTech, 2 students for 2-year MSc program, 15 students for ID PhD Program and 10 students for Joint Doctoral Program (JDP).

Postgraduate Courses in Interdisciplinary Program:

The programs under CIP have launched a variety of new elective courses. Furthermore, starting with the academic year 2022-2023, all ID MTech programs have undergone full revision and implementation.

Details of ID MTech programs started in the Academic Year 2022-2023:

Ophthalmic Engineering

1. Prepare professionals with a solid base in engineering and clinical exposure focussed on ophthalmology.
2. Provide professionals for technology organizations working in ophthalmology and related fields.
3. Inspire cross-functional (engineering and ophthalmology) teams to advance technology-related research in ophthalmology.
4. Enable engineers and clinicians to get deeply involved in designing better technology products/services
5. Create professionals who can take up technology challenges in ophthalmology as a startup

Integrated Circuits and Microsystem Packaging

1. The Integrated Circuits and Microsystems Packaging (ICMP) MTech program at IIT Hyderabad is a first-of-its-kind multi-departmental program that focuses on the design, fabrication, and characterization of electronic packages and microsystems.
2. The curriculum is designed to provide training in theoretical foundations and practical aspects by various departments, including Electrical Engineering, Mechanical and Aerospace Engineering, and Materials Science and Metallurgical Engineering.
3. The program will provide students with hands-on training in state-of-the-art design tools and equipment.

Details of ID MSc Program:

Medical Physics

IIT Hyderabad, in partnership with Basavatarakam Indo-American Cancer Hospital And Research Institute, launched an MSc in Medical Physics with approval from AERB. This is quite a unique program among all IITs where the students work closely with a cancer hospital in acquiring experience and knowledge on Radiation therapy, dosimetry, radiation safety and regulations in clinical practice. Medical Physics is a branch of Applied Physics that uses physics principles, methods and techniques in practice and research for the prevention, diagnosis and treatment of human diseases with a specific goal of improving human health and well-being.

Interdisciplinary and Joint PhD Program:

The Centre offers a unique interdisciplinary doctoral program where each enrolled student will be guided by two faculties from different disciplines in a project that needs multidisciplinary expertise. The CIP also hosts an interdisciplinary joint doctoral program with Deakin University, Australia, where the doctoral student receives a joint degree with IITH and Deakin University and will be guided by one supervisor from each Institute.

DIA-CoE

The journey of DRDO collaboration with IITH started in 2020 with a DRDO Research cell which has been transformed into a Centre of Excellence as DIA CoE. IIT Hyderabad will take up futuristic projects towards Long-term Directed Research needed for DRDO. There are 13 Projects undertaken by IITH for DRDO. Eight Projects are for Advanced Material & processing, three Projects for Sensors, seven for “Electronics, Micro Electronics & , and 2 for Computational Systems.” The Progress of these Projects is reviewed periodically by the TEC (Tech Evaluation), RAB (Research Advisory Board), and GC (Governing Council) of DFTM. Primary outcome is the Realization of Large size Additive Manufacturing machines and all the other Projects.

List of Equipment Sponsored by DIA-CoE, IITH



List of On-going projects under IITH

Project Titles	Name of the PI	PDC	Lab
Design of a cost-effective, real time and accurate Battery Management System (BMS) Controller unit for Battery Energy Storage System	Prof Amit Acharyya	22-06-2024	DSP
Development of Digital Scene Matching Area Correlation Algorithms & Prototype System	Prof Sumohana S Channappayya	12-07-2023	DRDL
Laser cladding of functional graded ceramic coatings for high temperature and wear applications: Assessment of mechanical properties and their correlation with molten pool history and its improvement through laser shock peening	Dr Muvvala Gopinath	21-06-2024	DRDL
Direct Metal Laser Sintering of C 103 Refractory Alloys	Dr Viswanath Chinthapenta	22-06-2023	DRDL
Development of Fibers Reinforced Alumina & Zirconia matrix Composites for high temperature applications	Prof Bharat B Panigrahi	08-07-2024	ASL
Study of storage ageing conditions (i.e. Shelf-life and Out-life) on physical, thermal and mechanical properties of Epoxy based prepreg systems (i.e. Tow & fabric Prepreg)	Prof Ch Subramanyam	22-06-2023	ASL
Thermo structural analysis for predicting damage in functionally graded plates using a peridynamic approach.	Dr Amirtham Rajagopal	22-06-2024	ASL
Investigating the evolution of heterogeneous microstructure in metallic alloys by Thermomechanical processing using correlative FIB SEM and in situ TEM techniques.	Dr Sai Rama Krishna Malladi	14-12-2024	DMRL
Large Area Additive Manufacturing (LAAM): Design and Development of Powder based Directed Energy Deposition System for Direct Fabrication of Rocket Components	Prof S Surya Kumar	29-03-2023	DRDL
Design and analysis of high accuracy MEMS accelerometer and gyroscope for inertial navigation	Prof Ashok Kumar Pandey	22-06-2024	RCI
Development of processes for SOI wafer dissolution and glass wafer through holes towards the realization of MEMS Inertial sensors	Prof Prem pal	08-07-2024	RCI
Design, analysis, verification and performance evaluation of Analog to Digital interface single-channel ASIC for high-performance closed-loop capacitive gyroscope for inertial navigation applications	Prof Abhishek Kumar	22-06-2025	RCI
Pressure less fabrication of carbon foam using bituminous coal for ablative applications	Dr Atul Suresh Deshpande	22-06-2024	ASL

ICMR-DHR-CoE

Webpage: <https://rdc.iith.ac.in/>

Indian Institutes of Technology, Hyderabad has been incorporated with the ICMR-DHR Centre of Excellence (CoE) for inculcating MedTech innovations. The CoE is a joint venture of the Indian Council of Medical Research (ICMR) and the Department of Health Research (DHR), as its name already suggests. The purpose of these centres is to develop products and technologies in conjunction with the requirements of the National Health Mission, Ayushman Bharat and Public Health Programmes of the government for their potential deployment, as reported by IANS.

Ongoing Projects:

1. Cervical cancer and cervico-vaginal infection screening kit
2. Tissue mimetic hydrogel-based therapy for corneal scarring
3. Tool for real-time sensor tracking over multiple trials
4. Rapid EEG gelling system
5. Compact and portable low-cost microscope for digital Cytology applications
6. Smart wearable patch for detecting nicotine in sweat samples
7. Image-guided Boiling Histotripsy Device for Treating Neuroblastoma
8. Customized 3D-printed PCL-silk scaffolds for implants

Companies Supported:

1. M/s Heamac Health Pvt Ltd -nLite360 Intelligent Phototherapy device that provides customized treatment to Dynamic Jaundice conditions
 2. M/s Beable Health Pvt Ltd-Game based Upper Limb Rehabilitation Device for Neuroplasticity
 3. M/s Kvyat Medical Pvt Ltd-DiaPatch with ActiFlush Technology: The world's first smart flushable Diaper
 4. M/s Nemocare Pvt Ltd-Nemocare Raksha: A diagnostic and Monitoring tool for neonates
- All have been selected by ICMR for HTA (Health Technology Assessment)

RDC - Rural Development Centre

Webpage: <https://rdc.iith.ac.in/>

Online teaching for rural village students:

Our honourable director has initiated online teaching for the government schools around IIT Hyderabad. The main motto of this programme is to enhance the learning skills of school kids with the help of IITH faculty, students and staff. This program is conducted from September 1, 2022, to November 31st, 2022, for the government schools in ZPHS Kandi, ZPHS Mamidipally, ZPHS Rudraram, ZPHS Cheriyal and ZPHS Mailaram. In this programme a total of 154 volunteers taught Mathematics, Physics, Biology and Chemistry subjects. IITH has spent approximately 4.6 lakhs to set up the computer desktops, LCD projectors, etc, for this purpose. Dr Debraj got CSR funding by HEFA of 54.835 Lakhs INR for Rural Development.

Paper publications from Dr Shiva Ji lab from research on rural areas of India:

- Pawar, T., Sharma, A., Ji, Shiva. (2022). Heritage Representation of Kashi Vishweshwar Temple at Kalabgoor, Telangana with Augmented Reality Application Using Photogrammetry. In: Mudanagudi, U., Nigam, A., Sarvadevabhatla, R.K., Choudhary, A. (eds) Proceedings of the Satellite Workshops of ICVGIP 2021. Lecture Notes in Electrical Engineering, vol 924. Springer, Singapore. https://doi.org/10.1007/978-981-19-4136-8_3
- Sharma A., Ji, Shiva., Varma, A. (2022). Enhancing Water Resilience by Rejuvenation of Traditional Water Management Systems Through Community Participation: A Case of Water Systems of Govardhan, Mathura, India. International Conference on Climate and Weather-related Extremes by IIT Roorkee 19-20 Sept 2022.

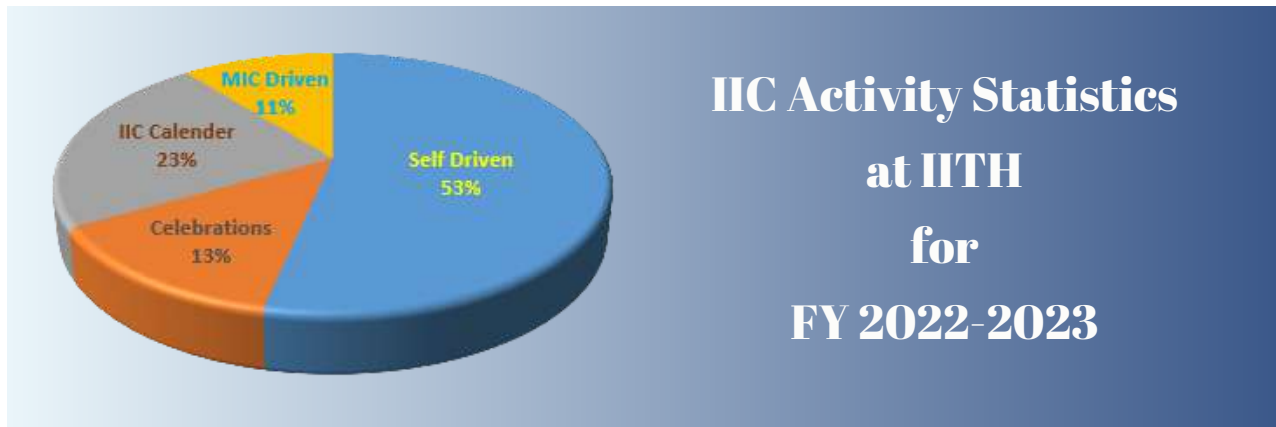


Innovation Cells

IIC - Institution's Innovation Council

Webpage: <https://innovationcouncil.iith.ac.in/>

The Institute Innovation Council (IIC) at IIT Hyderabad was initially established in February 2018 with Innovation, IPR, and Entrepreneurship as its 3 pillars. Later in February 2021, the council was reconstituted, as per the IIC norms, with an appropriate framework designed for its Objectives, Functions, Roles, and Responsibilities. Since then, all the innovation and entrepreneurship-related activities of IIC have been strictly implemented by the Council. The IIC meetings were conducted timely with all the representatives of the Council. IIC, IIT Hyderabad has 32 active members to inculcate the culture of Innovation and Entrepreneurship on campus. In FY 2022-2023, IIC at IITH has undertaken 75 activities under various categories, as summarized below.



Highlights:



Innovation Day Exhibition



Innovation and Entrepreneurship Outreach Program in School



Future Inventors Fair



LEAD Pitch by IITHAA



National Pollution Control Day and Energy Conservation Day, 2022

Hindi Cell

In pursuance of the Official Language Policy of the Government of India, the Hindi Cell of the Indian Institute of Technology Hyderabad is promoting the progressive use of Hindi in the Institute. Every possible effort is made by the Hindi cell to follow the rules and regulations related to the official language Hindi in the institute. The Quarterly Progress Report and Annual Evaluation Report related to the progress of the Official Language, Hindi, in our Institute, is sent by the Hindi Cell to the Department of Official Language, Government of India. The highlights of Hindi Cell's official language activities are as follows.

Ongoing Activities of the Cell:

Hindi Cell translates the Institute's Annual Report, Annual Audit Report, and various other documents like Office Orders, Office Memoranda, General Orders, Circulars, etc., which are covered under Section 3(3) of the Official Languages Act, 1963. In addition, various other letters and correspondence, RTI replies, etc., are either translated or prepared in Hindi. The Hindi Cell also tries to ensure the effective implementation of the "Official Language" policy of the Government of India in the Institute. Hindi Cell ensures the use of bilingual display boards and various name boards, notice boards, rubber stamps, letterheads, and bilingual file covers and also helps in compliance thereof. It also ensures bilingual preparation of degree certificates, PhD subject titles etc., to be awarded by the Institute during the convocation.

Hindi Language Training:

Hindi Cell emphasizes the need to impart Hindi training to all those employees of the Institute who do not have working knowledge of Hindi. The Hindi Cell nominates all such employees and gets them trained by getting them admitted in training programs like Prabodh, Praveen, and Pragya through the Hindi Teaching Scheme under the Central Hindi Training Institute. About 43 officers and employees were nominated in the said three training programs in the language training session of January 2023. For the first time in the history of our institute, the employees were nominated and trained for language training.

Hindi Workshops:

In order to solve the difficulties and problems faced by the employees in the use of official language in their day-to-day official work, the Hindi cell organizes Hindi workshops for the employees of the Institute in every quarter, and eminent official language scholars are invited to it. The details of the Hindi workshops organized are as follows:

Invited Guest Faculty		
23-06-2022	Dr Ravi Chandra Rao, Asst. Director, HTS, Secunderabad	Rajbhasha Skills
07-12-2022	Dr Atmaram, Asst. Professor, Hindi Dept, UoH	Official Language Implementation & Our Duties
18-01-2023	Smt Mitalee Agrawal, PRO, IIT Hyderabad.	Computer Hindi Typing Skills
01-03-2023	Shri Kamaluddin, Asst. Director, HTS, Secunderabad	Official Language Implementation & Noting and Drafting

Hindi Week Celebrations:

On the occasion of Hindi Diwas on 14 September 2022, Hindi Cell organized "Hindi Week Celebrations" from 14 to 20th September 2022 in the Institute. In the inaugural ceremony of this program, Prof Gajendra Kumar Pathak, HOD, Department of Hindi, University of Hyderabad, was invited as the chief guest. During this Hindi week celebrations, the Hindi cell organized many competitions for the faculty, staff, and students, like essay writing, Dumb charades, official terminology competition, and Extempore speech competition. Prof B S Murty, Director, IIT Hyderabad, was the chief guest on the occasion of the closing ceremony of Hindi week celebrations on 20-09-2021. Certificates and mementos were given to all the winners of the competitions organized during the Hindi week celebrations. In the end, the vote of thanks was given by Dr Anupam Gupta, Faculty In-charge, Hindi Cell & Member Secretary, OLIC, and after the national anthem, the Hindi Week celebrations were successfully concluded.

Bilingual Website:

According to the official language policy of the Government of India, the website of the Institute was made bilingual by the Hindi cell, and the annual report and annual audit reports, office orders, etc. of the Institute are also being uploaded on it.

Unicode:

Hindi Cell has put a detailed description on the intranet, "How to Install Unicode Fonts," with the help of the Computer Center to enable Unicode in computers of all departments of the Institute. The staff is being trained to work in Hindi.

Committees:

Official Language Implementation Committee

According to the guidelines of the Department of Official Language and on the recommendations of the Hindi Cell, the Official Language Implementation Committee(OLIC) was constituted on 06-09-2021. The Director of the institute is the Chairman of this committee, and the Registrar is the Vice-Chairman. All section heads are members of the committee. The faculty in charge of the Hindi cell is the member secretary of the committee. The purpose of this committee is to promote the implementation of the official language policies of the government and to review the progressive use of Hindi in the institute. In the financial year 2022-23, under the chairmanship of the Director of the Institute, meetings of the Official Language Implementation Committee were organized on 27 April 2022, 5 September 2022, 18 November 2022, and 13 February 2023. In all these meetings, discussions were held on taking all possible steps and taking necessary action to accelerate the progress of official language implementation in the institute.

Publications

To promote the activities of Hindi in the Institute, the publication of "Pravaat," a Hindi quarterly e-magazine, was started by the Hindi cell. Which was unveiled on September 14, 2022, by the chief guest Prof Gajendra Kumar Pathak, Head of Department, Department of Hindi, Central University of Hyderabad. during the inaugural ceremony of the Hindi week, in the presence of the Registrar, IITH Shri Commodore Manohar Nambiar, Faculty in charge of the Hindi Cell, Dr Anupam Gupta, and Hindi translator Shri Naveen Srivastava and other dignitaries. The first issue of the Pravaat Hindi quarterly e-magazine was published in October 2022, and the second issue in January 2023. The publication of Pravaat Patrika is going on continuously every quarter. In this magazine, faculty members, students, and employees of the institute send their research works, articles, poems, etc., for publication.



Unveiling of "Pravaat"
a Hindi quarterly e-magazine

Inspection Program of Parliamentary Committee on Official Language

On November 11, 2022, the first sub-committee of the Parliamentary Committee on Official Language conducted the inspection program of our institute, in which the Director of the institute, Prof B S Murthy, Registrar, Commodore Manohar Nambiar, Faculty in-Charge of Hindi Cell Dr Anupam Gupta and Hindi Translator Naveen Srivastava were present. The Parliamentary Committee on Official Language made some recommendations regarding the progress in the implementation of the official language in the Institute, which is being ensured compulsorily in the Institute.



Inspection Program of
Parliamentary Committee on Official Language

Celebrations



IITH on the International Yoga Day adored its importance by taking part in a life-filled yoga session led by Honorable Prime Minister Shri Narendra Modi.

Video Abstract:
<https://youtu.be/EPs1003f88o>

76th Independence Day has been celebrated with flag hoisting by esteemed Director, IITH, Prof B S Murty. Followed by recognition of Armed Forces of IITH (Staff & Students).

Video Abstract:
<https://www.youtube.com/watch?v=z0ia0YXxlV0>



IITH community took the integrity pledge to mark of the Vigilance Awareness Week - 2022.

In an enthusiastic spirit IITH has celebrated the ConstitutionDay/ SamvidhanDivas to commemorate the adoption of the Constitution of India, with a session of Preamble Reading by IITH fraternity and a talk on the theme "Responsibility of Citizens" by Shri M Ramana Kumar, Superintendent of Police, Sangareddy, Telangana.





From the vibrance of the tricolor to the vivid color of celebrations of being Republic IITH. Acting Director, Prof KVLS, Dept of Civil Engg, charged the spirit of patriotism with an encouraging & energizing address to the gathering.

IITH concluded Rashtriya Ekta Divas 2022 with Week-long Celebration with Unity Run, Pledge & an Exhibition on the life of the Iron Man of India Shri Sardar Vallabh Bhai Patel.



Hindi Cell, IITH commemorated the occasion of the Closing Ceremony of Hindi Week celebrations.

Program Broadcast: <https://youtu.be/eNZKJ96Qp5g>

On the enlivening occasion of International Womens Day, Student Gymkhana, IITH made an attempt to Know & learn from the Women of IITH "Their journey & Achievements in various roles & positions & their inspirational stories".

Featuring:
Dr Shuhita Bhattacharjee - LA,
Dr Jayshree Patnaik - EM, Dr Shruati Upadhyaya - CE and Ms Mitalee Agrawa - PRO





Hockey Club, IITH organized a Hockey Exhibition Match on National Sports Day to commemorate the birth anniversary of Hockey legend, Major Dhyan Chand.

Dept of Sports, IITH celebrated the 75th year of Independence Aazadi ka Amrit Mahotsav with "FIT RUN COMPETITION HARGHARTIRANGA ABHIYAN".

Video Abstract:
<https://www.youtube.com/watch?v=NN3-j5si7tM>



Department of Mathematics, IIT Hyderabad has decorously celebrated National Mathematics Day.

IIT Hyderabad has organized a Clean Campus drive on the occasion of Gandhi Jayanti.



Inventing & Innovating in Technology for Humanity

DEPARTMENTS

Department of Artificial Intelligence

The Department of AI, which came into existence in 2019, is making consistent progress in its pursuit of excellence in Academics and Research. The department graduated the country's first batch of AI BTech students in 2023.

The department added two new faculty members, Dr Konda Reddy Mopuri and Dr Ayon Borthakur, to its list of direct faculty members. Dr Konda Reddy works in the area of Computer Vision, whereas Dr Ayon Borthakur works in the area of Neuromorphic Computing. The department saw many activities aimed at bringing the student and faculty communities together. Faculty members gave invited lectures and inputs for policy-making through various events. Dr Vineeth presented at high-profile events such as Microsoft Research Workshop, Purdue University Seminar Series, Carnegie Mellon University CLear Seminar, etc. Dr Maunendra presented delivered invited lectures in the IEEE Seminar series, Symposium on Artificial Intelligence and Law (SAIL), Ed-Conclave: IIT Bombay's Annual Science and Technology festival. Dr. Konda Reddy presented in a capacity-building program at Asia@Connect. Dr Ganesh was involved in the design of standards for fairness assessment and ratings of AI systems. Dr Vineeth Balasubramanian and Dr. Sriji P K were instrumental in bringing the 14th edition of the Asian Conference on Machine Learning (ACML) to India. Dr Vineeth and Dr Sriji were two of the main organizers of ACML 2022, which saw large participation from national and international attendees at the event. They also organized OAMLS: Online Asian Machine Learning School to help prepare the next generation of machine learning researchers and practitioners by providing them with knowledge of machine learning, covering fundamentals as well as state-of-the-art advancements in the field.

The department faculty members continued to publish their research outputs at well-reputed venues such as AAAI, ICASSP, AAMAS, WACV, ACL, IEEE Transactions on Computational Social Systems, IEEE Transactions on Pattern Analysis and Machine Intelligence, IEEE Transactions on Artificial Intelligence, IEEE Journal on Selected Topics in Signal Processing, IEEE Access, etc. The department also strengthened its connection with the industry through seminars, sponsored and consultancy projects, invited talks, etc. With the field of AI, as well as the work being done in the department in these areas, gaining more prominence and visibility, the department aims to scale greater heights in the years to come.

For more information, please visit: <https://ai.iith.ac.in/>

Faculty

Head of the Department



Maunendra Sankar Desarkar

PhD: IIT Kharagpur
(Associate Professor-Computer
Science & Engineering)

Profile page:

<https://iith.ac.in/cse/vineethnb/>

Assistant Professor



Ayon Borthakur

PhD - Cornell University, USA

Profile page:

<https://iith.ac.in/mae/rpkumar/>



Ganesh Ghalme

PhD: IISc Bangalore

Profile page:

<https://iith.ac.in/ai/ganeshghalme/>



Konda Reddy Mopuri
 PhD: IISc Bangalore
Profile page:
<https://iith.ac.in/ai/ganeshghalme/>

Internal Adjunct Professor



Abhinav Kumar
 PhD - IIT Delhi
Profile page:
<https://iith.ac.in/ee/abhinavkumar/>



Aditya T Siripuram
 PhD - Stanford University
Profile page:
<https://iith.ac.in/ee/staditya/>



Amit Acharyya
 PhD - University of Southampton, UK
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Publications:

1. Mopuri K R, Bilen H, Tsuchihashi N, Wada R, Inoue T, Kusanagi K, Nishiyama T, & Tamamura H. (2022). Early sign detection for the stuck pipe scenarios using unsupervised deep learning. Journal of Petroleum Science and Engineering. <https://doi.org/10.1016/j.petrol.2021.109489>.
2. Nayak G K, Mopuri K R, Jain S, & Chakraborty A. (2022). Mining Data Impressions from Deep Models as a Substitute for the Unavailable Training Data. IEEE Transactions on Pattern Analysis and Machine Intelligence, 44(11). <https://doi.org/10.1109/TPAMI.2021.3112816>.

Funded Research Projects:

1. Ganesh Sambhaji Ghalme; Learning in the Presence of Strategic Agents; 55.4 L. [SERB-CRG/AI/F293/2022-23/G532].
2. Mopuri Konda Reddy; Deep Learning for Long-Tailed Computer Vision Tasks; 18.06 L. [G558].

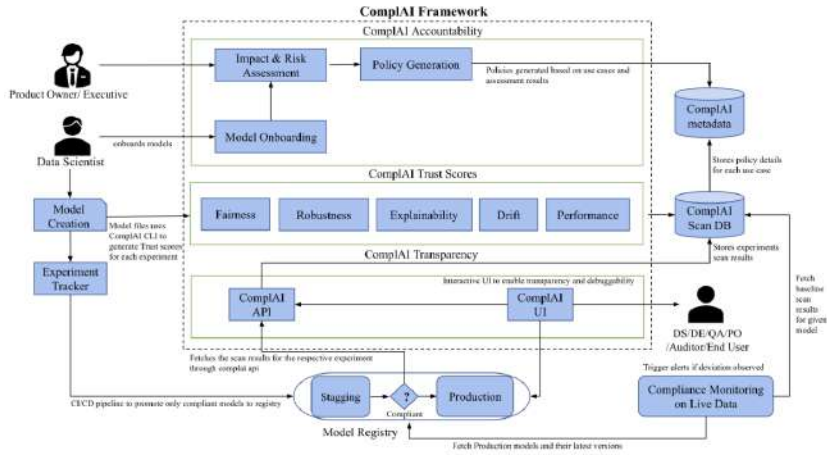
Awards & Recognitions:

1. Ganesh Sambhaji Ghalme received the Best Paper Award for the Paper titled "Efficient Algorithms for Fair Clustering with a New Fairness Notion" presented at the RBCDSAI FCAI Conference on Deployable AI (DAI) 2022.

Research Highlights:

1. A framework for multifactor assessment of supervised ML - Dr Maunendra Sankar Desarkar

A framework for multifactor assessment of supervised ML methods is proposed in this work. The framework works based on the concept of counterfactuals. The framework generates synthetic counterfactuals, which come in handy, especially for small datasets, as the real counterfactuals in such cases can actually be far from the query data points. ComplAI produces multiple quantitative assessment scores for performance, robustness, drift, etc., and also a single Trust factor score that can be used to compare multiple models for the same task.

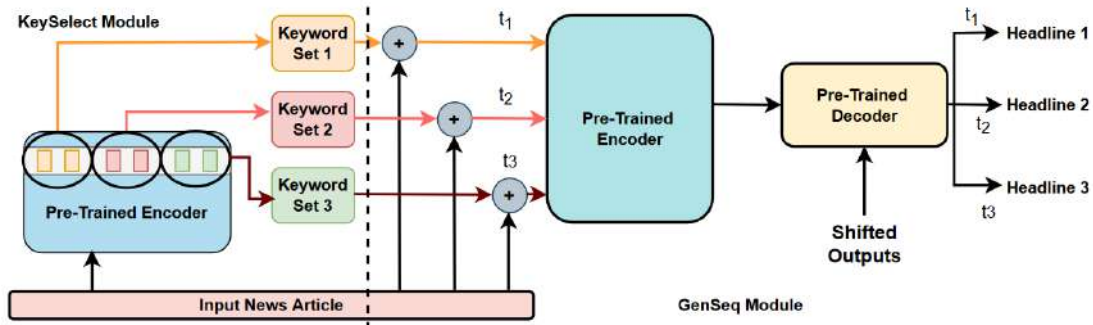


A framework for multifactor assessment of supervised ML

Publication: De A, Gudipudi S S, Panchanan S, and Desarkar M S. (2023). ComplAI: Framework for Multi-factor Assessment of Black-Box Supervised Machine Learning Models. In Proceedings of the ACM Symposium on Applied Computing (pp. 1096–1099). Association for Computing Machinery.

2. A framework for generating multiple parallel headlines for input articles - Dr Maunendra Sankar Desarkar

A framework for generating multiple parallel headlines for input articles is proposed. The work first identifies theme keywords and general keywords from the input. Then, it uses these keywords to generate headlines that are grounded on the theme but different from each other in lexical and/or semantic terms – and are representative of the input article.



A framework for generating multiple parallel headlines for input articles

Publication: Venkatesh E, Kaushal Maurya, Deepak Kumar, and Maunendra Sankar Desarkar. 2023. DivHSK: Diverse Headline Generation using Self-Attention based Keyword Selection. In Findings of the Association for Computational Linguistics: ACL 2023, pages 1879–1891, Toronto, Canada. Association for Computational Linguistics.

Department of Biomedical Engineering

While we celebrate the running of 15 glorious years of IIT Hyderabad, the Department of Biomedical Engineering (BME) has completed 11 years of its splendid journey. After moving to our own department building in 2021, we established 11 research labs and two teaching labs in the last year. The department has achieved a marvelous feat in academic programs and research activities. Currently, the department has 11 full-time faculty, four adjunct faculty, and one visiting faculty. Last year, Prof Mohanan from Sree Chitra Thirunal Institute of Medical Sciences joined us as an adjunct faculty. He is well known for the Toxicity/biocompatibility studies of materials and medical devices, and this has also reinforced our efforts for toxicological testing of biomaterials and medical device research. The department has eight staff members (2 TS, 3 JT, 1 Technical Officer, 1 Veterinary Officer, Executive Administrative Assistant, and Junior Administrative assistant). Three new staff joined us in the year 2022-23.

Apart from that, the department currently has 113 registered PhD students (i.e., ~10 PhD students/faculty – a remarkable number indeed), with many students supported by sponsored research grants. In 2022-23, 6 students completed their PhD program. The department also has 56 BTech and 28 MTech students. This is the third year of our BTech program, and we have been receiving accolades for running a unique BTech program in Biomedical Engineering. Our BTech curriculum has also been replicated at different Institutes and Universities. Also, our MTech program now has two streams of specialization, namely, MEDSAS (Medical Sensing, Analytics, and Software) and NBM (Nanomedicine Biomaterials). The department also participated in starting a new MTech course in Ophthalmic Engineering along with several other departments within the Institute and in collaboration with LV Prasad Eye Hospital. We have also increased the courses having lab component to 50% of total courses. Several BME courses represent the latest and advanced research of high relevance for today. All the students who completed their MTech degree in 2022 got placements; typically, 50% of students opted for industry jobs, and the remaining 50% pursued higher studies. In 2022-23, 25 PhD students joined the PhD program; amongst them, six students were selected for the prestigious PMRF fellowships.

In terms of research activities, the Department has done an excellent job in the year 2022-23 by securing eight extramural research grants from various funding agencies worth ~ 9 Cr, with a couple of high-value research grants like Indo-Italy Networks of Excellence in Computational Neuroscience and Sree Ramakrishna Paramhanmsa Research Grant in Biomedical Sciences (SreePVF). The faculty from BME published ~ 86 research articles in 2021-22; among them, > 20 research articles were published in Q1 journals. The faculty from BME delivered more than 40 seminars/talks at several international and national conferences/symposia. Several students received the best presentation/poster award in different conferences/symposia.

For more information, please visit: <https://bme.iith.ac.in/>



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Patents:

Filed:

1. Aravind Kumar Rengan; A Multimodal Liposomal Composition for Naja Naja Venom Neutralization, and a Method for Producing the Same; 202241024566.
2. Aravind Kumar Rengan; Encapsulated Nano Formulations of Buparvaquone and Methods of Preparation Thereof; 202241062262.

Published:

1. Aravind Kumar Rengan; Modified PEG-400 (mPEG-AA complex) and Uses Thereof; 202141003895.
2. Falguni Pati; Silk Fibroin Microfiber Reinforced Polycaprolactone Composites; 202141055556.
3. Falguni Pati; A Footwear and a Method of Manufacturing Thereof; 202041047879.
4. Subha Narayan Rath; Microfluidic Platform for Three-Dimensional Cell Culture and Multi-Drug Testing and Methods of Fabrication Thereof (Provisional patent); 202141030041.

Granted:

1. Jyotsnendu Giri; Biopolymer-based nanoparticles and a method of preparing the same; 201741027986.

2. Jyotsnendu Giri; A method of producing lipid-based nanocapsules without temperature cycling and the product thereof; 201741012592.

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1. Shinde V R, Revi N, Murugappan S, Singh S P, & Rengan A K. (2022). Enhanced permeability and retention effect: A key facilitator for solid tumor targeting by nanoparticles. Photodiagnosis and Photodynamic Therapy, 39(undefiend).
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- blinding corneal diseases; 299.77 L. [SPVF/BME/F165/2022-23/S214].
5. Falguni Pati; Development of advanced healthy and diseased in vitro 3D glomerulus model for drug testing and understanding Kidney disease mechanisms; 47.23 L. [DBT/BME/F165/2022-23/G457].
6. Falguni Pati; Therapeutic potential of decellularized cornea matrix (DCM) hydrogel for corneal scars and stromal replacement in trauma conditions: Pre-clinical study; 33.16 L. [ICMR/BME/F165/2022-23/G494].
7. Harikrishnan Narayanan Unni; Neurological implications of traumatic brain injury – multiscale modeling of brain strain-induced Tau protein aggregation; 6.6 L. [SERB/BME/F108/2022-23/G533].
8. Jyotsnendu Giri; Antibacterial, host-modulating and regenerative nanofibers membrane for guided tissue regeneration; 23 L. [DBT/BME/F122/2022-23/G516].
9. Kousik Sarathy Sridharan; Digital Takshashila; 547 L. [G447].
10. Nagarajan Ganapathy; Development of Quantum Neural Networks for Smart Mental Healthcare; 21 L. [cohort2].
11. Nagarajan Ganapathy; SMART-BEING: Smart Multimodal Enabled Affective Computing to Promote Wellbeing; 20 L. [AC2023-4].
12. Nagarajan Ganapathy; Empowering Elderly with Healthy and Independent Living using Multimodal Sensors, Fusion and Artificial Intelligence Techniques; 25 L. [SG134].
13. Nagarajan Ganapathy; India aircraft Pilot vital sign monitoring and Assessment; 2 L. [Honeywell-SOW].
14. Renu John; ICMR CoE; 1500 L. [g 402].

Funded Research Projects:

1. Avinash Eranki; Dual-Mode Ultrasound for Soft Tissue Sarcoma Therapy; 33 L. [G411].
2. Avinash Eranki; ICMR Medical Device Secretariat - CoE; 152 L. [G402].
3. Avinash Eranki; Portable Ultrasound Device for Non-Invasive Therapy of Solid Tumors; 50 L. [G000].
4. Falguni Pati; Biomimetic hydrogel for the treatment of

Awards & Recognitions

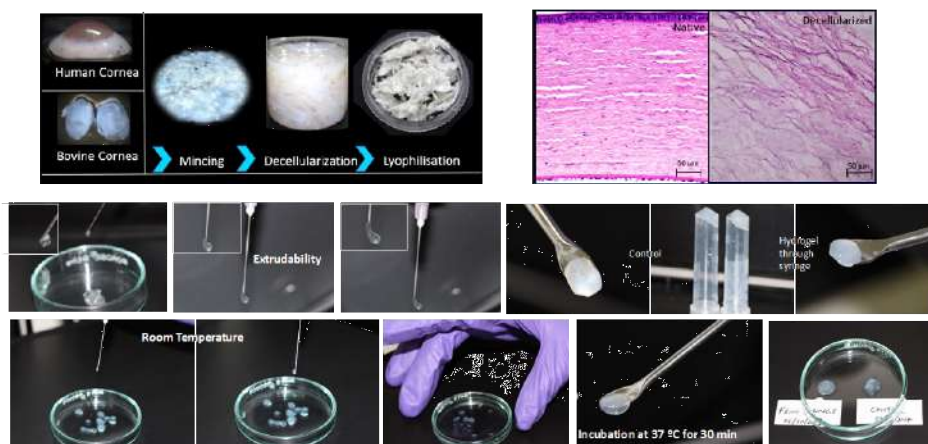
1. Aravind Kumar Rengan has been selected as the Associate Fellow - Telangana Academy of Sciences.
2. Aravind Kumar Rengan received an SIRE Fellowship to visit Univ of Alberta.
3. Aravind Kumar Rengan has been selected as a co-opted member of the SERB-PAC committee in Biomedical and Health Science(BHS).

4. Falguni Pati received a cutting-edge, highly competitive Sree Ramakrishna Paramhansa Research Grant in Biomedical Sciences worth 3 Cr from the Sree Padmavathi Foundation.
5. Ms Ramya, working under the guidance of Falguni Pati, won the Start-up Pitch Challenge at AMTECH Hyderabad on "3D Printing in Craniomaxillofacial Reconstruction."
6. Jyotsnendu Giri received the IIT Hyderabad Research Excellence Award 2022.
7. Sunil Kumar Yadava, working under the guidance of Jyotsnendu Giri, received Moderna's Global Fellowship.
8. Mohd Suhail Rizvi received the IIT Hyderabad Teaching Excellence Award 2022.
9. Nagarajan Ganapathy has been selected as the DAAD Research Ambassador - (2022 -25) - Indo-German Exchange Programme.
10. Renu John has been selected as the Fellow of the Royal Society of Biology London, 2022.
11. Sikandar Shaikh has been conferred with the HALL OF FAME Award by Tamilnadu and Pondicherry State Chapter IRIA Indian Radiological and Imaging Association.
12. Subha Narayan Rath has been selected as a Member of the Expert working group for "alternatives to animal methods" in Indian Pharmacopoeia, IPC, Ministry of Health and Family Welfare, Govt. of India and has also been selected as a Member of Technical Expert Committee on Human Genetics, Genome Engineering & Nanotechnology Applications in Healthcare, Department of Biotechnology, Govt. of India.

Research Highlights

1. Biofabrication and Tissue Engineering (BioFabTE) Lab - Dr Falguni Pati

BioFabTE Lab along with his team has developed a hydrogel from discarded corneas from human and bovine sources using a novel and simple method. Serendipitously, they discovered the most striking feature of this tissue-specific hydrogel to prevent the cells from scar tissue formation, which is attributed to the microenvironment that cannot be offered by any synthetic or other natural material. Capable of being injected owing to its two phases (liquid and gel) based on the incubation temperature, we explored its potential to serve as a material for minimally invasive treatment to replace complicated surgeries. Until now, no strategy is available to prevent corneal scarring following an injury. They demonstrated, for the first time, that this hydrogel can be applied immediately after injury which helps to regenerate the cornea without scarring. Furthermore, no treatment is available other than partial donor corneal graft or corneal transplantation for scarring, which is already present in the visual acuity. This study has immense translation potential for different corneal pathologies including traumatic injuries and subsequent scar formation, corneal ectasia and even regenerating the entire cornea, thereby eliminating the current dependency on the donor corneas. Many works are in the pipeline. Already they completed multiple sets of pre-clinical studies, which provided them with promising results. They are planning for human pilot studies for some of its applications soon" Furthermore, they have explored and initiated a new strategy of excising only the scar tissue and filling the wound bed with DCM hydrogel that can regenerate the corneal tissue to a normal level with fair transparency. They also checked its potential to be a treatment strategy for Ectasia for which only complicated therapeutic strategies and troublesome surgeries including donor cornea transplantation are available. For the first time, they demonstrated that the DCM hydrogel has the potential to thicken the Ectatic cornea to normal thickness. Finally, they develop a complete human cornea to replace the human cadaveric donor cornea by 3D bioprinting technology, first ever in India.



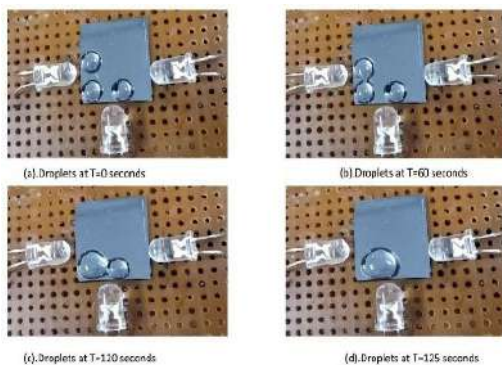
Development of decellularized cornea matrix (DCM) hydrogel and evaluation of the extrudability of DCM hydrogel



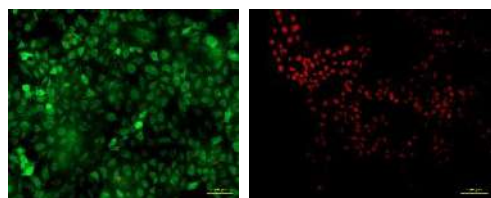
3D Bioprinting of Human cornea with decellularized cornea matrix (DCM) hydrogel and implantation of the same on rabbit surgical depletion model

2. Biomicrofluidics and Biomechanics lab - Dr Harikrishnan Narayanan Unni

BML is focused on the design and development of chip-scale microfluidic systems for various bioanalytical applications, including biosensing and on-chip exploration of disease biology. Another area of focus is the computational modelling of biomechanics and mechanobiological systems. We utilize both continuum and molecular models to study the behaviour of biological elements. During the past year, we published a novel work on the development of chip-scale optowetting droplet devices for cancer drug screening [1]. Another key ongoing work is the molecular model of nano-enabled drug transport in cancer cell membranes. We have obtained interesting simulation results from molecular dynamics simulations of nanoparticle transport in lipid bilayer membranes, which is in process of manuscript preparation. The molecular models will be further validated using tumour-on-chip microfluidic designs.

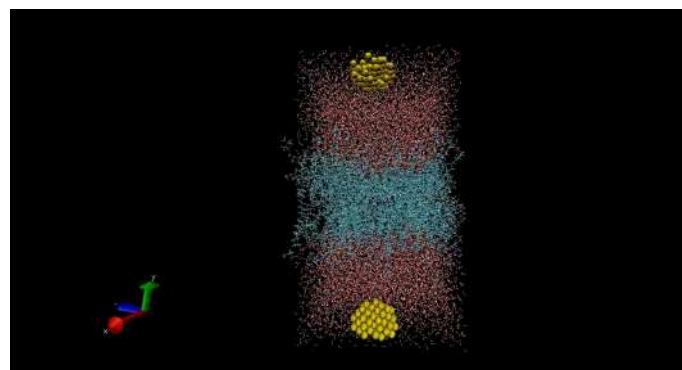


A



B

(A) Droplet on-chip optowetting system, (B) A549 cancer cells before and after drug treatment



A



B

(A) Molecular model of nanoparticle transport in cell membranes, (B) Biomimicking tumour-on-chip microfluidic platform for validation of molecular model

3. Neurotechnology and Neuroscience Lab - Dr Kousik Sarathy

Stroke is a leading cause of death and disability in India and the world over, with the residual motor deficit after stroke resistant to most available therapies. After the cerebrovascular event, the patients undergo early but limited restoration of lost motor functions, the time scale of which might range from a few weeks to a month. The patients undergo rehabilitation training, which may lead to a slow but steady and partial restoration of lost functions with persistent residual disability. There is an imperative to develop methods and markers to improve overall stroke rehabilitation outcomes and prescribe personalized rehabilitation paradigms. The two overlapping themes of the present work are 1) Development of cost-effective methods for the assessment of recovering stroke patients and 2) Metrics/markers that track valid motor-recovery-affecting-dimensions in stroke (like the CSI) and enable continuous adjustment of rehabilitative regimen (personalization). Electrophysiological assessment was performed while 118-channel EEG, EMG, ECG, and EOG were recorded concurrently with g.HIAmp system (g.Tec GmbH, Austria) with g.SCARABEO active electrodes at a sampling rate of 1200 Hz while patients were administered steady-state vibrotactile stimulation (SSVBT) with the paradigm described in the figure. We were able to elicit a steady-state response to the stimuli reliably. The SSVBT showed a clear dependence on the side of brain injury, where the ipsilesional hemisphere showed a marked reduction in cortical response to the SSVBT stimuli, while the contralesional response remained unaffected. These results pave way for a larger cohort study alongside anatomical characterization for the potential use of VBT stimuli to assess the integrity of the sensory centripetal sensory pathways.

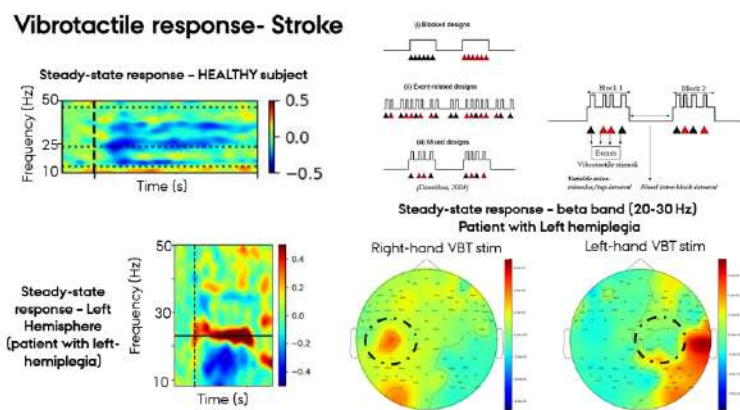
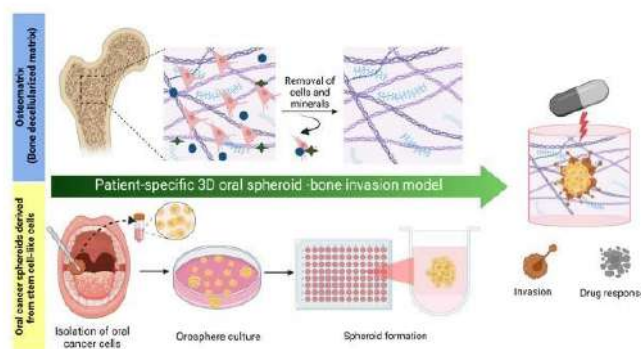


Fig. Vibrotactile response- Stroke

4. Regenerative Medicine and Stem Cell Research (RMS) Lab - Prof Subha Narayan Rath

The RMS Lab have developed a number of research studies. These works contribute to the advancement of biomedical and tissue engineering, showcasing innovations in areas such as microfluidics, bioprinting, and biomimetic materials. Notable works include:

- CANCER-ON-CHIP:** "Osteomatrix as a personalized 3D tissue-specific invasion test-bed for oral carcinoma" by VS Sukanya et al. The study presents an osteomatrix-based 3D tissue-specific invasion test-bed for oral carcinoma, allowing personalized testing of invasive behaviour. In collaboration with Dr Harikrishnan "On-chip mixing of cancer cells and drug using LED enabled 2D opto-wetting droplet platforms" by T Thomas et al. This paper presents a technique involving LED-enabled 2D opto-wetting droplet platforms for mixing cancer cells and drugs on a chip. In collaboration with Dr Sishir of the EE dept, "Thin Microfluidic Chips with Active Valves" by E Prajapati et al. was published. This work focuses on the development of microfluidic chips with active valves, potentially useful for various applications.



Osteomatrix as personalized patient-specific tissue-specific invasion test bed

- **CARTILAGE Tissue engineering:** "3D Bioprintable Hypoxia-Mimicking PEG-Based Nano Bioink for Cartilage Tissue Engineering" by S Ravi et al. The study introduces a 3D bioprintable nano bioink made from PEG-based materials that mimic hypoxic conditions, suitable for cartilage tissue engineering.
- **dECM-based electrospun tendon:** "Biomimicking tendon by electrospinning tissue-derived decellularized extracellular matrix for tendon tissue engineering" by A Ruhela et al. This paper explores the use of electrospun tissue-derived decellularized extracellular matrix for engineering tendon-like structures.
- **3D biprinted tubular blood vessels:** "Bioengineering strategies for 3D bioprinting of tubular construct using tissue-specific decellularized extracellular matrix" by M Kamaraj et al. This study explores bioengineering strategies for 3D bioprinting tubular constructs using tissue-specific decellularized extracellular matrix derived from discarded patient vein samples, making the construct patient-specific.

Department of Biotechnology

Our vision is to foster a world-class teaching environment and state-of-the-art facilities for cutting-edge biotechnology research to drive an academic space that is dedicated to cultivating innovative opportunities and systemwide collaboration for discovery beyond boundaries. Our mission is to accelerate as an outstanding educational hub with an equal emphasis on excellence in teaching, research, and community engagement. We promote equality and empower our students, staff, and faculty to achieve intellectual rigor, academic leadership, and global recognition to best serve the nation and society. We are committed to the utmost professional and academic standards to ensure intellectual excellence and to create a global impact by transmitting advanced knowledge. We aspire to value the highest academic and professional integrity, scientific ethics, and excellence in teaching and research to realize the full potential of biotechnology.

In addition to research and teaching, the department actively collaborates with industry partners, government organizations, and national/international institutions. These collaborations facilitate the exchange of knowledge, technology transfer, and the translation of research findings into real-world applications.

For more information, please visit: <https://biotech.iith.ac.in/>



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Publications:

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Funded Research Projects:

1. Anamika Bhargava; Hands-on one to one training in single cell patch-clamp; 1.53 L. [SLSL/BT/F145/2022-23/C944].
2. Anamika Bhargava; Game-changing low-cost, accurate and user-friendly patch-clamp microfluidic chip-based system for measurement of ion-channel activity in live biological cells; 35.8 L. [IITH/BT/F145/SOCH2].
3. Anamika Bhargava; Challenging the paradigm: activating T-type calcium channel isoform Cav3.1 for breast cancer therapy; 8 L. [AC2022-1].
4. Anindya Roy; Molecular Characterization of anti-HIV drug Ritonavir as an inhibitor of DNA alkylation repair protein ALKBH2 (BT/PR43137/BRB/10/2015/2021); 17.16 L. [DBT/BT/F049/2022-23/G487].
5. Anindya Roy; Methyl enol ethers as versatile building blocks for the one pot synthesis of novel fused benzene, furocoumarins, enamides, & benzofurans and evaluation of biological activity; 52.84 L. [SERB/CHY/F042/2022-23/G512].
6. Avanthi Althuri; Integrated platform for lignin-hydrogels and one-pot production of mono-saccharomates and lactic acid from lignocellulosic waste; 30 L. [SG/IITH/F304/2022-23/SG-135].
7. Gaurav Sharma; A systems biology approach to define the host response in SARS-CoV-2 induced multisystem inflammatory syndrome in children (MIS-C) with neurological manifestations; 49 L. [2021-3668].
8. Gunjan Mehta; Role of chromatin remodelers in meiotic recombination and transcriptional switch during yeast meiosis, with emphasis on genetic disorders, infertility, and cancers; 20 L. [AC2023-2].
9. Gunjan Mehta; Mechanistic understanding of functioning of CHD1 remodelers using biochemical, structural and single-Molecule imaging approaches; 54.76 L. [DBT/BT/F131/2022-23/G514].
10. Himanshu Joshi; Computational Exploration of Membrane Spanning DNA Nanostructures for cellular drug Delivery; 26.21 L. [SERB-DST/BT/F286/2022-23/G531].

11. Himanshu Joshi; Understanding DNA-Based Nanostructures using Molecular Simulation; 35 L. [DST/BT/F286/2021-22/G467].
12. Thenmalarchelvi Rathinavelan; Exploring the mechanistic role of Saccharomyces cerevisiae Stm1 protein in apoptosis-like cell death; 30.75 L. [SERB/BT/F087/2022-23/G535].
13. Raghavendra Nidhanapati K; Inhibition of interaction between receptor binding domain of spike protein of SARS-CoV-2 and human ACE2 by protein mimic DNA; 6 L. [G356].
14. Raghavendra Nidhanapati K; Characterization of human E2 enzyme Ube2N response to DNA; 35.13 L. [G396].
15. Rajakumara Eerappa; Mechanistic understanding of functioning of CHD1 remodelers using biochemical, structural and single-Molecule imaging approaches; 54.76 L. [DBT/BT/F131/2022-23/G514].
16. Sandipan Ray; Comprehensive Characterization of the Circadian Regulations of Kinases and Diverse Signaling Pathways; 28.71 L. [SRG/2021/000671].
17. Sandipan Ray; In-Situ Nano-Transformable Hydrogel for Affordable Targeted Therapy of Highly Metastatic Cancers; 100 L. [IITH/BME/F163/SOCH3].

Awards and Recognitions:

1. Avanthi Althuri is the invited Journal Reviewer for Microbial cell factories, Springer Nature (Impact factor: 6.352)-2023-till date.
2. Gaurav Sharma received the AMI Young Scientist Award in the field of Environmental Microbiology.
3. Gaurav Sharma has been inducted as Life Member of 'Association of Microbiologists of India (AMI).
4. Gaurav Sharma has been inducted as Member of 'American Society for Microbiology (ASM).
5. Gaurav Sharma has been inducted as Microbiology Society Full Concessionary Member Worldwide.
6. Sandipan Ray become an Editorial Board Member of Frontiers in Sleep (Frontiers, ISSN: 2813-2890).

Highlights:

1. The department started a unique biannual "hands-on lab training (HLT) program". The program is designed to provide intensive hands-on training in tools and techniques in biotechnology or bioinformatics in advanced research labs. The HLT program aims to bridge the gap between formal education and research/industry needs in the biotechnology sector by imparting skills at the forefront.
2. Biotech Foundation Day was celebrated on 12th Nov'2022 in the esteemed presence of Dr K Thangaraj, Director, Centre for DNA Fingerprinting and Diagnostics – CDFD.



HANDS-ON lab training
in
BIOTECHNOLOGY / BIOINFORMATICS

The Department of Biotechnology, IIT Hyderabad invites applications for the biannual Hands-on lab training (HLT) program in Biotechnology/Bioinformatics. The program is designed to provide intensive hands-on training in tools and techniques in biotechnology *or* bioinformatics in advanced research labs. HLT program aims to bridge the gap between formal education and research/industry needs in the biotechnology sector by imparting skills at the forefront. Not only undergraduate, postgraduate or doctoral students but industry professionals can advance their skillset with our HLT program.

Information Links
IITH website: www.iith.ac.in
Department of Biotechnology website: <https://biotech.iith.ac.in/>
Department of Biotechnology brochure: <https://biotech.iith.ac.in/pages/brochure.html>





Department of Chemical Engineering

With IIT Hyderabad consistently flying high in the NIRF ranking, ChE@IITH is committed to set new heights for excellence in chemical engineering education, research and expert consulting support to the process industries. With 23 committed faculty members, the department targets to execute this ambitious plan by adopting a holistic approach of (i) fractal and hands-on / project based practical teaching, (ii) connecting interdisciplinary research approaches to the socially relevant problems, (iii) inculcating the start-up culture and making high quality education accessible for all. Broadly, teaching covers various aspects of chemical, biochemical, minerals, materials and process systems engineering. Our electives provide exposure to the state-of-the-art developments in the fields of energy, new materials, nano-science, machine learning and biochemical engineering. ChE@IITH encompasses both BTech and MTech programmes featuring a curriculum that is both comprehensive and as flexible as having the option of exploring internship opportunities. Hosting nearly 57 PhD and 24 MTech students, department's strong commitment towards research is evidenced by ~INR 45 crores extramural funding (through DST, DBT, DRDO, National Supercomputing Mission, National Textile Mission etc. and several corporate organizations) that faculties have obtained so far, many of which have been translated into high TRL level inventions. Faculty bestowed with the prestigious Vasvik award, and several department faculties appearing among top 2% scientists in the world (Stanford University list 2022) bearing the testimonies of quality and research environment in the department.

A large number of faculty from the department are actively involved in hosting / participating in conference and outreach workshops (TEQIP, ATAL-FDP) delivering invited / keynote lectures benefitting the students and faculties across several institutes in India. The department also houses state-of-the-art research and teaching laboratories. The faculty members in the department conduct research in a wide variety of exciting areas such as catalysis, fluid flow, nanotechnology, materials for energy and biological applications, bioengineering, atomistic simulations, efficient energy harvesting and storage, process control and optimization, machine learning, techno-economic analysis, supply chain management, mineral processing and climate change. With such aims, the department aligns itself with the nation's several missions and dedicates itself towards the dream of nation building.

For more information, please visit: <https://che.iith.ac.in/>



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Patents:

Filed:

1. Suhanya Duraiswamy; Bacterial Cellulose Based Microfluidic Poc Device for AST; 202241030646.

Published:

1. Chandra Shekhar Sharma; Methods of Production of Pencil Needle Powder Based Graphite-Silica Composite Electrode; 202141012545.

Granted:

1. Chandra Shekhar Sharma; Cellulose Acetate Based Non-Woven Nanofiber Matrix with High Absorbency Properties for Female Hygiene Products; 3684/CHE/2014.

Publications

1. Garimella S M, Anand M, & Rajagopal K R. (2022). Jeffery-Hamel flow of a shear-thinning fluid mimics the response of viscoplastic materials. *International Journal of Non-Linear Mechanics*, 144: Article 104084. <https://doi.org/10.1016/j.ijnonlinmec.2022.104084>.
2. Anand M, Pantelev M A, & Ataullakhanov F I. (2022). Computational models of hemostasis: Degrees of complexity. *Applications in Engineering Science*, 10: Article 100103. <https://doi.org/10.1016/j.apples.2022.100103>.
3. Garimella S M, Anand M, & Rajagopal K R. (2022). Start-up shear flow of a shear-thinning fluid that approximates the response of viscoplastic fluids. *Applied Mathematics and Computation*, 412: Article 126571. <https://doi.org/10.1016/j.amc.2021.126571>.
4. Andreeva A A, Anand M, Lobanov A I, Nikolaev A V, & Pantelev M A. (2022). Using extended ODE systems to investigate the mathematical model of the blood coagulation. *Computer Research and Modeling*, 14(4): 931-951. <https://doi.org/10.20537/2076-7633-2022-14-4-931-951>.
5. Garimella S.M, Anand M, & Rajagopal KR. (2022). A new model to describe the response of a class of seemingly viscoplastic materials. *Applications of Mathematics*, 67(2): 153-165. <https://doi.org/10.21136/AM.2021.0163-20>.
6. Phukan M, Haritha P, Roy T R, & Iyer B V S. (2022). Mechanical response of networks formed by end-functionalised spherical polymer grafted nanoparticles. *Soft Matter*, 128(undefined). <https://doi.org/10.1039/d2sm01174c>.
7. Iyer B V S. (2022). Effect of functional anisotropy on the local dynamics of polymer grafted nanoparticles. *Soft Matter*, 18(33). <https://doi.org/10.1039/d2sm00710j>.
8. Karumban K S, Muley A, Giri B, Kumbhakar S, Kella T, Shee D, & Maji S. (2022). Synthesis, characterization, structural, redox, and electrocatalytic proton reduction properties of cobalt poly pyridyl complexes. *Inorganica Chimica Acta*, 529(undefined). <https://doi.org/10.1016/j.ica.2021.120637>.
9. Gupta Y, Zaidi Z, Mehta S, Chandewar P R, Kumar N, Paul A K, Shee D, Mondal A, Sorokhaibam L G, & Banerjee A. (2022). Assembly of a coordination polymer with sulfate-capped pentamolybdate units and copper: synthesis, structure, magnetic and catalytic studies. *Dalton Transactions*, undefined(undefined). <https://doi.org/10.1039/d2dt00816e>.
10. Sriramoju S K, Babu V, Dash P S, Majumdar S, & Shee D. (2022). Effective Utilization of Coal Processing Waste: Separation of Low Ash Clean Coal from Washery Rejects by Hydrothermal Treatment. *Mineral Processing and Extractive Metallurgy Review*, 43(2). <https://doi.org/10.1080/08827508.2020.1833196>.
11. Raj Kumar Oruganti, Debasis Pal, Tarun K Panda, Debaprasad Shee, Debraj Bhattacharyya. (2022). Green synthesis of calcium-oxide nanoparticles impregnated activated carbon from algal-bacterial activated sludge: its application in ciprofloxacin removal, *International Journal of Environmental Science and Technology*. <https://doi.org/10.1007/s13762-022-04662-2>.
12. Vannathan A A, Chandewar P R, Shee D, & Mal S S. (2022). Polyoxovanadate-Activated Carbon-Based Hybrid Materials for High-Performance Electrochemical Capacitors. *Journal of the Electrochemical Society*, 169(5). <https://doi.org/10.1149/1945-7111/ac6c58>.
13. Muhammed Anees P K, Vannathan A A, Abhijith M B, Kella T, Shee D, & Mal S S. (2022). Imidazolium cation linkers of polyoxomolybdate-polypyrrole nanocomposite electrode-based energy storage supercapacitors. *Materials Chemistry and Physics*, 277(undefined). <https://doi.org/10.1016/j.matchemphys.2021.125441>.
14. Giri B, Mahata A, Kella T, Shee D, De Angelis F, & Maji S. (2022). Tetrazole-Substituted isomeric ruthenium polypyridyl complexes for low overpotential electrocatalytic CO₂ reduction. *Journal of Catalysis*, 405(undefined). <https://doi.org/10.1016/j.jcat.2021.11.023>.
15. Maity S, Vannathan A A, Chandewar P R, Shee D, Das P P, & Mal S S. (2022). Vanadomanganate as a synergistic component in high-performance symmetric supercapacitor. *Journal of Alloys and Compounds*,

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Funded Research Projects:

1. Alan Ranjit Jacob; 3D printing of energetic materials design & development of 3D printer accompanied by feasibility stu; 25.49 L. [S181].
2. Anand Mohan; An efficient framework for simulating blood flow in a stenosed channel; 39.15 L. [DBT/CHE/F045/2022-23/G486].
3. Debaprasad Shee; The Experimental Investigation and Numerical Modelling of Heat Absorption Efficacy of Additive Enhanced Endothermic Rocket Fuels; 230.58 L. [DRDO/MAE/F219/2022-23/S253].
4. Kishalay Mitra; Prediction of Microstructure & correlating it with mechanical properties for all grades of steel rolled in HSM; 58.26 L. [Tata/CHE/F089/2022-23/S219].
5. Kishalay Mitra; The Experimental Investigation and Numerical Modelling of Heat Absorption Efficacy of Additive Enhanced Endothermic Rocket Fuels; 230.58 L. [DRDO/MAE/F219/2022-23/S253].
6. Mahesh Ganesan; Efficient Control of Elasticity in Dilute Fractal Colloidal Gels; 28.49 L. [SERB/CHE/F288/2022-23/G501].
7. Ranajit Mondal; Industrial energy assessment as part of "Kotak-IITM save energy mission (KISEM)-IIT Hyderabad"; 139.8 L. [S-270].
8. Saptarshi Majumdar; Drug Delivery for Glaucoma Treatment; 90 L. [G244].
9. Saptarshi Majumdar; Biomaterial Development with Cross-linker free polymers; 41 L. [G418].
10. Shelaka Gupta; Rational Design of Transition Metal catalyst for the production of value-added chemicals from biomass Derived 2-pyrone Molecules; 28.91 L. [DST SERB/CHE/F238/2022-23/G495].
11. Suhanya Duraiswamy; Targeting the Splicing and Stability of Androgen Receptor Splice Variants in Castration-Resistant Prostate Cancer; 18.11 L. [ICMR/BT/F188/2022-23/G549].
12. Suhanya Duraiswamy; Label-free molecular spectroscopic studies for accurate and rapid detection of pathogens in urinary tract infection; 20 L.
13. Suhanya Duraiswamy; Microfluidic Chip to Capture and Lyse Pathogen from Body Fluids; 49.82 L. [MHRD-STARS/CHE/F222/2020-21/G288].
14. Suhanya Duraiswamy; Microfluidics enabled Programmable and Controllable Assembly of Plasmonic Nanomaterials – Development of a NanoBioSensor; 31.7 L. [SERB/CHE/F222/2021-22/G408].
15. Suhanya Duraiswamy; Development of laminar flow micro fuel cells for application in low power consuming devices; 10 L. [ID].
16. Vinod M Janardhanan; Development and characterization of unitized regenerative fuel cells for high temperature operation; 38.64 L. [G415].

Awards & Recognitions:

1. Chandra Shekhar Sharma has been featured as one of the 75 under 50 scientists Shaping Today's India in a compendium prepared by DST and published by Vigyan Prasar as a part of Azadi ka Amrit Mahotsav Celebration of India's 75th year of Independence.
2. Chandra Shekhar Sharma has been selected as PAC Member, SERB SRG & NPDP Committee (Engineering Sciences) (2022-24).
3. Chandra Shekhar Sharma has been selected as PAC Member, SERB SURE Scheme (2022-23).
4. Chandra Shekhar Sharma has been selected as Guest Editor-in-chief, 4th Special issue of Proceedings of Indian National Science Academy (PINSAs) Journal edited by INYAS, Springer Nature.
5. Giridhar Madras has been awarded with the Research.com Chemistry in India Leader Award for being ranked in the top 10 scientists in India in chemistry.
6. Kirti Chandra Sahu, Kishalay Mitra, and Dr.Narasimha Mangadoddy have been featured in Stanford University's ranking of the world's top 2% of scientists (2022).
7. Kishalay Mitra received IIT Hyderabad Faculty Research Excellence Award presented by Padma Bhushan Senapathi "Krish" Gopalakrishnan on the Foundation Day eve.
8. Kishalay Mitra has been named among World's Top 2% Scientists, according to the latest profile review (2022) conducted by Stanford University.
9. Kishalay Mitra has been chosen as Expert Member, PMRF Review Committee (Interdisciplinary areas in Science and Engineering).
10. Parag Pawar has been awarded with IIT Hyderabad Teaching excellence Award.
11. Satyavrata Samavedi has been selected as the Guest editor for the Special issue of JoVE.
12. Shelaka Gupta has been selected as one of the 75 Women in STEAM to be featured in the second edition of She Is.

13.. M Narasimha appeared in the top 2% Scientists in the world (second time in a row), according to the latest profile review conducted by a group from Stanford University, that has released in September 2022; <https://elsevier.digitalcommonsdata.com/datasets/btchxktzyw/4>.

14. M Narasimha has been the Guest Editor for “Proceedings of the 1st International Conference in Fluid, Thermal and Energy Systems: ICFTES 2022”, Springer publication will be released by May, 2023.

15. Suhanya Duraiswamy received the Excellence in teaching, IITH, 2022-23.

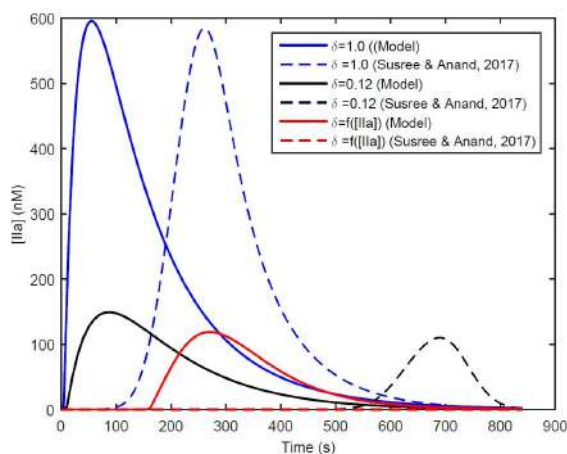
Highlights

- Several department faculties are continued
- As editorial board members of several reputed international journals,
- As member in several technical committees of different ministry (SERB, Coal etc.),
- As member, board of studies of several reputed engineering colleges,
- As organizing committee members of several national / international conferences
- IITH Chem Engg PhD students recruited as faculty members in leading IITs and other CFTIs
- Active participation of department in Joint PhD Program with Deakin University, Australia & Swinburne University of Technology, Australia
- Strong research collaboration with University of Texas, Austin, University of Exeter, UK, University of Cape Town, South Africa.
- Excellent placement for B Tech & M Tech students.
- Department is implementing the First level DST FIST award to improve its current infrastructure.

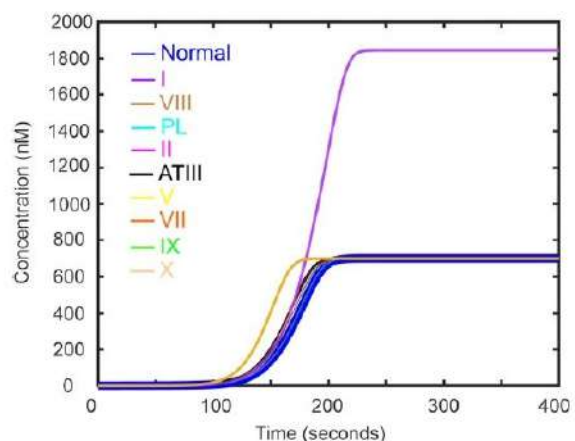
Research Highlights

1. Cardiovascular Mechanics - Dr Anand Mohan

Cardiovascular Mechanics refers to the application of mechanics to understand the structure-function relationships within the cardiovascular system as they pertain to health and disease. A key motif of our research has been that an interdisciplinary or cross-disciplinary approach reveals unique insights into these relationships that a field-restricted approach is not capable of doing. In line with this, our focus is to develop and apply mathematical models and computational tools to propose hypotheses that can be tested by experimental data and clinicians, respectively. Simulations are a cost effective and non-invasive tool that serve to reduce the number of experiments or clinical trials involved in this field. We have demonstrated that mathematical models of coagulation need to incorporate the latest hypotheses governing the role of platelets as elucidated by experimental biochemists (Figure 1). Excitingly, we also demonstrated the potential of mathematical modeling to identify the coagulation factors responsible for the increased clot formation in COVID-19 patients (Figure 2).



Effect of coated platelets on coagulation



Impact of COVID-19 on fibrin conc.

2. Materials Systems Design - Dr Balaji Iyer

We have looked at two different aspects of dynamics of polymer grafted nanoparticle (PGN) systems. In the first study we have looked at the role of functional anisotropy on local dynamics. In the second study, we have extended our understanding on the effect of grafting density to look at bulk mechanical properties of PGN networks. The studies provide a fundamental understanding of broken symmetry observed in anisotropic systems and role of non-bonded/bonded interactions on the dynamic response of particle-polymer hybrid networks.

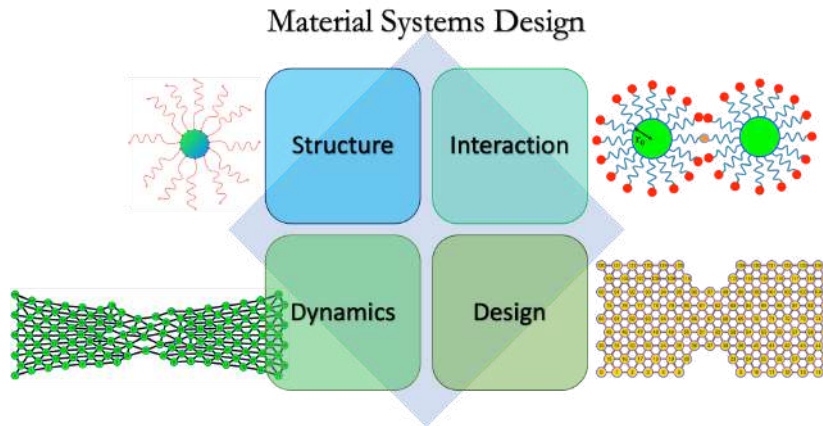
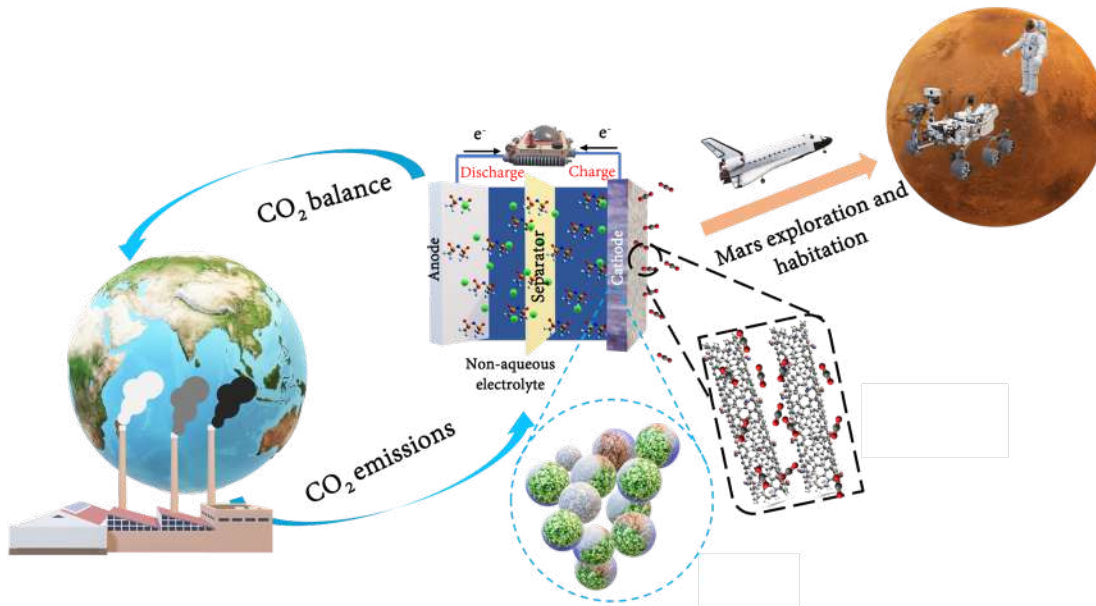


Fig. Materials System Design

3. Metal-CO₂ Battery: Bridging the Two Worlds at Earth and Mars - Prof Chandra Shekhar Sharma

"A small step for a man, a giant leap for mankind" fits aptly to our work towards developing the Metal-CO₂ battery technology. The technology is significant owing to its capability to recycle CO₂ emissions for utilization as an energy storage system and its ability to replace conventional Li-ion batteries due to its nearly three times energy density. As research continues to make human life possible on Mars, energy systems that can sustain life are needed.



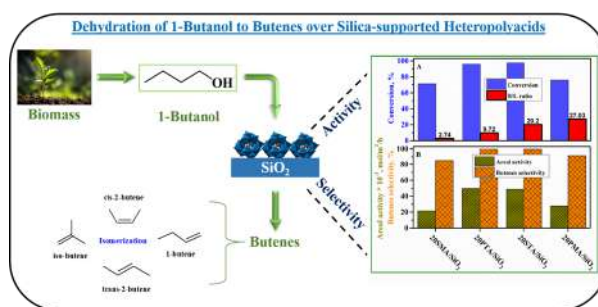
Due to the unique atmosphere consisting of 95% CO₂, the Martian atmosphere provides a natural operating condition for the operation of the Metal-CO₂ battery and can be used to meet energy requirements.

However, a significant challenge involving the reluctance of the decomposition of the stable discharge product Li₂CO₃ on the electrode as per the reaction $2\text{Li}_2\text{CO}_3 + \text{C} \rightarrow 4\text{Li}^+ + 3\text{CO}_2 + 4\text{e}^-$ leads to increased potential during charging and reduced cycling life.

Our group aims to solve these challenges and make the battery ready for future utilization on Earth and Mars by engineering different battery system components. We demonstrated the first prototype of a working Li-CO₂ battery system in the Martian gas atmosphere in 2021. Further in recent developments, by incorporating carbon and transition metal composite catalysts on the cathode and theoretical understanding using first-principle DFT calculations, we were able to reduce the activation energy for the decomposition of the discharge product and increase the operational battery life to more than 700 hours of continuous operation with a constant discharge and charge voltages of ~ 2.8 V and ~ 4.1 V. Also, the modification of electrolyte and separator is being looked into by us at CARBON Lab to solve the triple challenges of electrolyte loss from the system, ultrawide temperature (-60 °C to 60 °C) operability, and increasing the practically achievable energy density helping us reach the goal of balancing the Earth and sustaining life on Mars.

4. Sustainable production of chemicals - Dr Debaprasad Shee

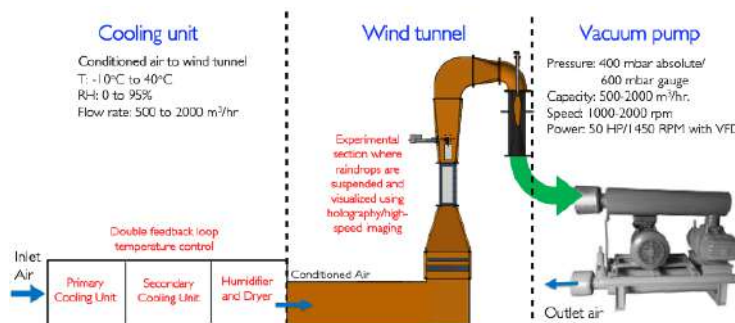
The production of building block chemicals from renewable sources is very much essential to address the sustainability issue of human civilization. Catalytic processes to produce methanol butylene's and building block aromatics are developed. The primary focus is to design and development various types of supported metals and metal oxides which are active and selective for the production of desired products. Specifically, Zn and Ga incorporated HZSM5 zeolite catalyst exhibit higher selectivities of aromatics and BTEX. Furthermore, the selectivity to different aromatics was also affected by the variation of different process parameters. The maximum selectivity of total aromatics (~75%) and BTEX (~69%) were achieved at 723 K, 1 bar pressure and 0.75 h-1 of WHSV over Ga or Zn/HZSM5 catalysts. Moreover, another important building block chemical, butylenes can be produced with high selectivity and yield using metal cluster catalysts called as polyoxometalates which have unique catalytic properties. The dehydration of n-butanol over phosphotungstic acid)/SiO₂ and silicotungstic acid)/SiO₂ catalysts afforded ~ 99.0% selectivity towards butylenes at quantitative conversion of n-butanol. The selective partial oxidation of methane over supported transition metal oxide catalysts produces methanol. The yield of methanol depends on the desorption of methanol, active metal centre and lattice to adsorbed oxygen concentration ratio which can be considered as important properties of the catalysts. The depolymerization of lignin using supported metal catalysts produces targeted oxygenated aromatics with high yield. The optimization of process parameters and catalyst composition leads to the cleavage of crucial linkages of the lignin. The selective cleavage of lignin linkages produces higher yield of oxygenated aromatics.



Production of butylenes from n-butanol

5. Raindrop Research for Accurate Rainfall Prediction - Prof Kirti Chandra Sahu

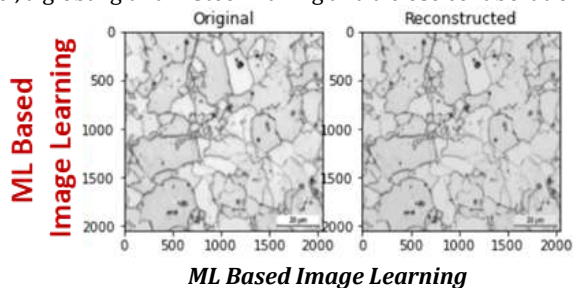
Our research primarily focuses on studying the microphysics of raindrops. We developed a unique experimental facility that mimics the dynamic atmospheric conditions of raindrops descending from cloud to ground (see Figure 1). Accurate rainfall prediction is one of the grand challenges in environmental research due to its relevance in understanding climate change and its accompanying socio-economic impacts, but it is far from perfect. Our research provides important information on the three-dimensional shape, velocity, and size distributions of raindrops for weather forecasting and enables more accurate rainfall prediction.



Raindrop Research Facility (RRF) established at IIT Hyderabad

6. Decoding the Process-Structure-Property Mapping - Prof Kishalay Mitra

Processing condition-Structure-property (P-S-P) correlation development is ongoing research that can be extremely helpful for novel materials discovery. Existing methods, be it experimental or high-fidelity physics driven simulations, require a lot of resources towards unveiling this hidden code. Recent developments in artificial intelligence (AI) & machine learning (ML) and novel research in Global Optimization and Knowledge Unearthing Lab (GOKUL) have shown a possibility in achieving this feat utilizing limited resources. Targeting a very complicated alloy making operation, important ones are identified from a sea of features based on their sensitivities on the overall system. An extremely efficient systematic real plant experimentation generates the data connecting microstructures, product properties and operating conditions without disturbing the plant operation at all. Finally, AI/ML models can be built to have the aforementioned three- layer mapping which helps decoding the mystery of P-S-P correlation development. This project is an ongoing one with Tata Steel, a global giant in Steel making and a close collaboration partner in GOKUL's research.

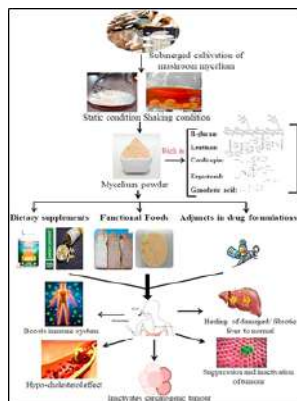


7. Fluid Flow Modelling and Analysis of Low and High Gravity Spiral Concentrators - Prof Narasimha Mangadoddy

Spiral concentrators, consisting of an open trough that twists vertically downward about a central axis, are used to separate radially thin-film slurry of mineral and gangue material by particle density and size. Flow field of spiral concentrator is very complex due to inherent thin film and various turbulent scales involved. We have explored the flow studies and design parameters on high-gravity spirals, as most of the literature studies are made only on LD9 spirals (low gravity), exclusively used for coal separations. Unless the flow features between low-gravity and high-gravity spirals are compared, their accurate applications and performance levels are not clearly understood. However, a range of the latest spiral designs exists in the mineral industry, which resulted from trial & error approaches, no quantified flow field studies are made on them. The water flow depth and free surface velocity were measured on high-gravity spiral concentrators using a depth gauge and a high-speed camera utilizing tracer particles. The velocity vectors indicate an increase in magnitude from the inner column to the outer edge. High gravity spirals show lower flow depths and free surface velocities but steeper depths on the outer zone than low gravity spirals.

8. Production and Optimization of Mycelium Biomass from *P. ostreatus* - Dr Santhosh Kumar Devarai

Mycelium biomass and exopolysaccharides (EPS) from *Pleurotus ostreatus* origin have gained peculiar attention because of their myriad applications in the food and pharmaceutical industries. Mycelial growth is greatly dependent on culture media and physical conditions. The research aims to produce mycelium biomass and exopolysaccharide (EPS) using one factor at a time (OFAT) approach. The current study investigates the effect of the concentration of various carbon, nitrogen sources, metal ions and cell numbers in inoculum for biomass and EPS production. The results revealed that the 5 wt%/v malt extract and 2 wt%/v glucose combined with traces of metal ions gave the maximum yield of biomass and EPS as 31.55 g/l and 6.65 g/l respectively.



Polysaccharides are a diverse class of bioactive compounds present in mushrooms with repetitive structural characteristics that are polymers of monosaccharide residues joined together by glycosidic bonds. The antitumor effects of mushroom polysaccharides are produced by activating various immune responses in the host. A high protein and total phenolics content has been obtained in the supernatant of media as 5.178 g/l and 104.18 mg GAE/g dw respectively. Moreover, it has been reported that the metal ions and inoculum volume are quite significant factors for biomass and EPS production. Furthermore, the obtained lyophilized biomass powder was investigated by FTIR, SEM-EDS and XRD for their chemical, morphological and structural characterization respectively. Recent studies proved that the β -glucan polysaccharides from mushrooms have antiviral properties and may be able to combat the coronavirus that causes SARS-CoV-2 disease (COVID-19) due to its various immunomodulation mechanisms.

Unveiling the biological activities of *P. ostreatus* and its bioactive compounds

Mushroom based Sustainable Bio-materials

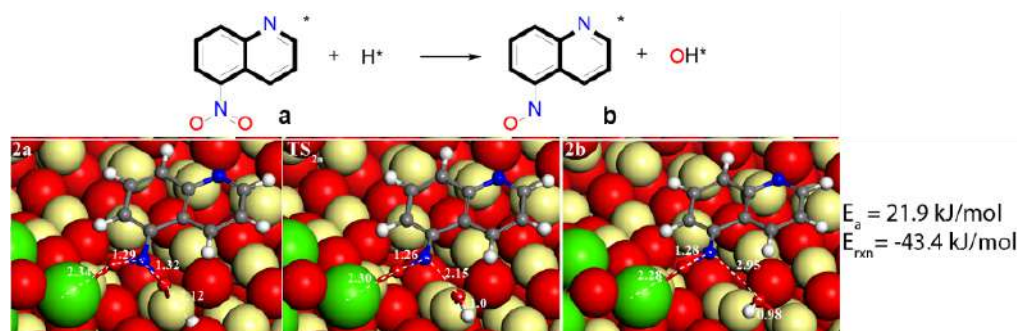
Mushroom are also used in production of various materials such as bio-leather, mycelium bio-composites, mycelium bio-foams etc. The right packaging materials can preserve food quality; for this reason, it is crucial to use safe and green packaging materials. Numerous biomaterials are currently being researched for use in the food industry as packaging materials that might serve as pathogens or bacterial control agents. A compact lattice structure is formed when the mycelium colonizes and binds the substrate completely. This compact structure can be obtained according to the desired shape using the mould.

Production and Purification of Extracellular Lipase and Its Application in Biodiesel Synthesis

Production of lipase using agro-industrial wastes as solid substrates in solid-state fermentation on both flask scale and large scale has been studied. The lipase purification was achieved to homogeneity using different purification techniques such as ammonium sulphate precipitation followed by dialysis and gel filtration chromatography. The enzyme molecular weight was determined using SDS-PAGE. The purified lipase was characterized under different conditions and enzyme kinetics studies were performed. The purified enzyme was immobilized in calcium alginate beads by entrapment. The beads were used as a biocatalyst in biodiesel synthesis by transesterification and esterification reactions using waste cooking oil and methanol. A new HPLC method has been developed to separate and efficiently quantify the fatty acid methyl esters Methyl Oleate and Methyl Palmitate in biodiesel mixture using reverse-phase HPLC.

9. Oxygen vacancy mediated reduction of nitro-N-heterocycles to amino-N-heterocycles - Dr Shelaka Gupta

Copper oxide (CuO) was used as a reusable solid reagent for hydrogenation of nitro-N-heterocycles. In the presence of hydrazine hydrate as the reducing agent, CuO under mild reaction conditions resulted in complete conversion of nitrobenzene and 5-nitroquinoline (5-NQ) to aniline and 5-aminoquinoline respectively. However, the presence of additional ring in 5-NQ slightly impeded the reaction rate on CuO. Further it was observed that during the reaction, CuO was converted to inactive Cu. DFT simulations indicated facile formation of oxygen vacancies ($E_{O,vac} = -3.8$ kJ/mol) on the surface of CuO (111) under the reducing environment consistent with the XPS analysis. Oxygen vacancies facilitated stronger binding (E_b) and reduced activation barrier (E_a) for N-O bond dissociation of nitrobenzene ($E_b = -148.5$ kJ/mol, $E_a = 36.4$ kJ/mol) and nitroquinoline ($E_b = -174.4$ kJ/mol and $E_a = 43$ kJ/mol). Addition of CaO to CuO further increased the formation of oxygen vacancies ($E_{O,vac} = -43.4$ kJ/mol) on the interface of CaO/CuO surface under reducing environment and resulted in an increase in the binding of 5-NQ (-218.4 kJ/mol) on the non-stoichiometric CaO/CuO (111) surface and reduced the activation energy ($E_a = 21.9$ kJ/mol) for N-O dissociation. The CaO/CuO composite was found to be more stable than CuO during the experiments. The defect induced reactivity by CaO/CuO was therefore found to be an effective synthetic route to amino-N-heterocycles.



Reactant, product and transition state structures for the hydrogenation of 5-NQ on non-stoichiometric CaO/CuOv (111) surface. (In collaboration with IIT Palakkad, IIP Dehradun and IIT Delhi.)

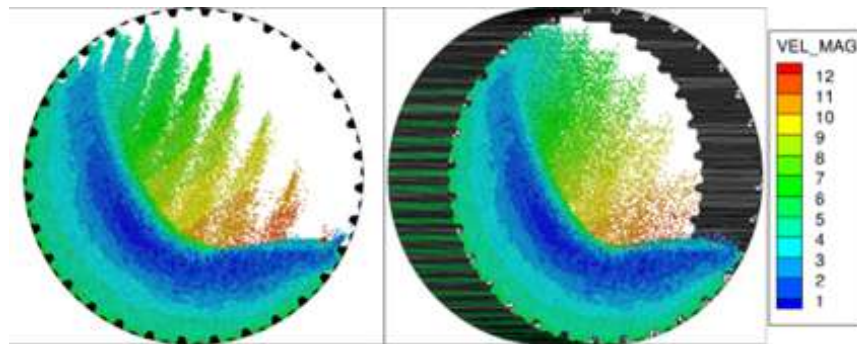
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10. Development of GPU based 3D coupled CFD-DEM modelling for spherical particles for application in mineral processing - Dr Narasimha Mangadoddy.

Laboratory-scale testing for particle dynamics is expensive and cumbersome; therefore, computational discrete element simulations (DEM) are a realistic option for aiding in the understanding of particle dynamics. GPU accelerated

simulation allows simulations to be conducted in a fraction of time by massively parallelizing compute-intensive elements of the calculations. The GPU's highly threaded nature makes it an excellent choice for DEM simulations. At IITH, we have developed GPU DEM code for mineral processing applications such as hoppers and tumbling mills. The developed code was used to examine the influence of three lifter profiles and mill speeds on the granular dynamics and power consumption of a laboratory-scale tumbling mill. It was observed that for mill speeds less than 75% of the critical mill speed, the effect of various lifter profiles on particle dynamic behavior is minimal. This gives us the confidence to develop a significantly faster GPU-accelerated DEM code while maintaining reasonable accuracy at the microcontact level. Furthermore, the predictive capability of GPU-based DEM was demonstrated in an industrial-scale mill containing one million particles as shown below Fig.



GPU based 3D coupled CFD-DEM modelling

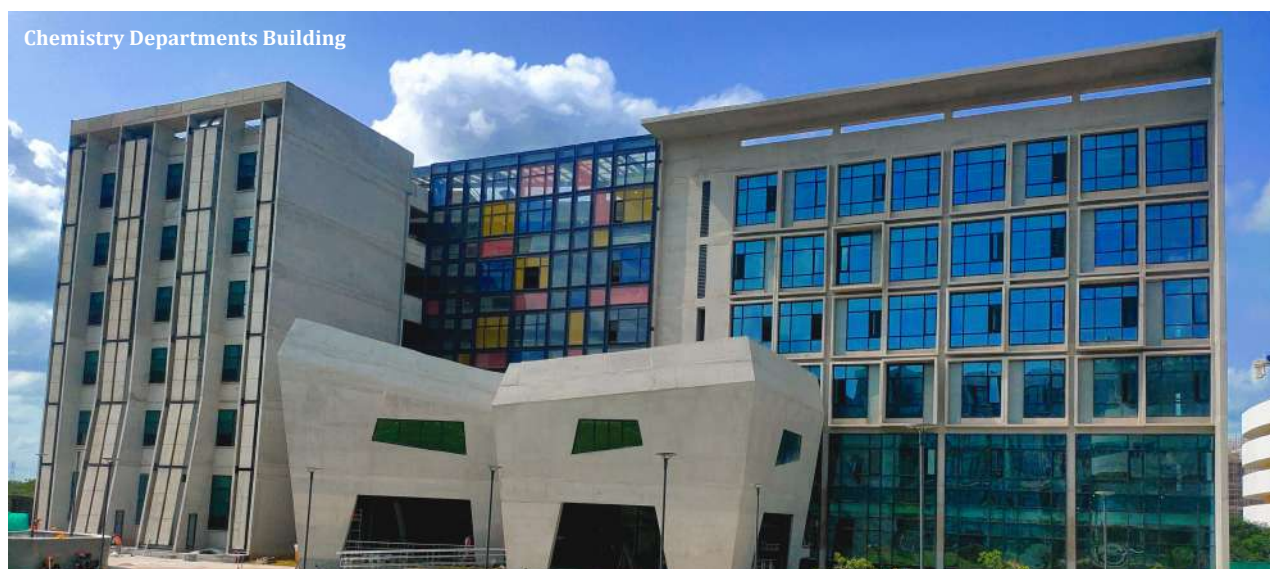
Department of Chemistry

In the fiscal year 2022-2023, the Department of Chemistry at IIT Hyderabad showcased a dynamic and comprehensive approach to cutting-edge research across various domains. Prof F A Khan spearheaded a pivotal exploration into organic chemistry, concentrating on the synthesis of natural products and analogs. This research holds profound implications for pharmaceuticals, materials science, and industrial applications, representing a significant stride in advancing fundamental knowledge and potential breakthroughs in the development of novel materials and drugs.

Under the leadership of Prof G V Satyanarayana, the department delved into remote C-H functionalization for drug diversification, highlighting a forward-looking emphasis on sustainable synthetic tools such as electro-organic synthesis and photocatalysis. This strategic approach aligns with global priorities for sustainable scientific practices, addressing the critical need for diversified drug options while emphasizing environmental responsibility. Dr Ashutosh Kumar Mishra's innovative work added a unique dimension to the department's research portfolio. His design of an efficient synthetic enzymatic model, featuring optimized non-covalent interactions and inducing rare coordination behavior for flavin entities, showcased the department's commitment to interdisciplinary research. The applications spanned from selective organelle tracking to diverse enzymatic processes, reflecting the department's dedication to exploring novel methodologies with potential applications in biotechnology and medicine.

The department's endeavors extended across diverse research areas, including light-mediated organofluorine chemistry and hydrogenation advancements led by Dr Kishore Natte, air pollutant mitigation and hydrogen production by Pro. Ch Subrahmanyam, and the development of an electrochromic device with a novel viologen by Prof M Deepa. Prof S K Martha's breakthroughs in energy storage and Dr Surajit Maity's pioneering work in laser spectroscopic methods further emphasized the department's commitment to advancing knowledge in diverse chemical disciplines. The multifaceted research contributions also encompassed studies by Dr Koyel Banerjee Ghosh on spin-selective charge transfer, Dr Priyadarshi Chakraborty's development of a peptide-based hydrogel, and Prof Tarun Panda's focus on green methods for organic synthesis. These initiatives collectively underscore the department's dedication to exploring new frontiers in chemistry, promising lasting impacts on academic understanding, addressing real-world challenges, and shaping the future landscape of the discipline.

For more information, please visit: <https://chemistry.iith.ac.in/>



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Funded Research Projects:

1. Abhijit Sau; Design and synthesis of Bleomycin carbohydrate; 25 L. [SG-132].
2. Ashutosh Kumar Mishra; Bioinspired novel design built around neutral flavin core skeleton as fluorescent probes for bioimaging and sensing applications; 47.26 L. [SERB/CHY/F198/2022-23/G530].
3. Bhabani Shankar Mallik; Ionic Transport, Solvation and Interfacial Interactions of Electrolytes from computer Simulations; 31.06 L. [SERB/CHY/F079/2022-23/G515].
4. Bhabani Shankar Mallik; Understanding the mechanism of molecular dissociation for the generation of renewable fuel through the computational catalysis approach; 30.56 L. [SERB/CHY/F079/2022-23/G525].
5. Ch Subrahmanyam; Research and Development of Low GWP Chemicals; 50 L. [Ozone cell/F019/2022-23/S256].
6. Ch Subrahmanyam; Research and Development of Low GWP Chemicals; 50 L. [Ozone cell/F019/2022-23/G528].
7. Debasish Koner; Exploring the reaction dynamics and molecular spectroscopy in gas phase for systems relevant to atmospheric and astro-chemistry; 7 L. [IFA19-CH318].
8. Faiz Ahmed Khan; Methyl enol ethers as versatile building blocks for the one pot synthesis of novel fused benzene, furocoumarins, enamides, benzofurans, and evaluation of biological activity; 52.84 L. [SERB/CHY/F042/2022-23/G512].
9. G Prabusankar; N-Heterocyclic Neutral Donor Ligands and AIE Assisted Luminescent Organometallic Complexes with Higher Quantum; 35.68 L. [DST CRG/CHY/F043/2022-23/S255].
10. G Satyanarayana; Research and Development of Low GWP Chemicals; 50 L. [Ozone cell/F019/2022-23/S256].
11. G Satyanarayana; Research and Development of Low GWP Chemicals; 50 L. [Ozone cell/F019/2022-23/G528].
12. Jai Prakash; Syntheses of New Layered 3D Transition Metal Based Chalcogenides for Superconducting and Magnetic Applications; 39.36 L. [SERB/CHY/F180/2021-22/G413].
13. Koyel Banerjee Ghosh; Spin-Controlled charge transfer at chiral electrodes and its application in the oxygen reduction reaction; 30.9 L. [SERB/CHY/F284/2022-23/G491].
14. Krishna Gavvala; Exploring Novel Nucleoside Analogues to Probe the Key Protein-DNA Interactions Using Spectroscopic Tools; 27.6 L. [G319].
15. Priyadarshi Chakraborty; DBT Ramalingaswami Fellowship; 52.5 L. [DBT/CHY/F322/2022-23/G496].
16. Priyadarshi Chakraborty; Seed Grant; 25 L. [SG/IITH/F322/2022-23/SG-146].
17. Sivakumar V; Molecular engineering of organic antennas and their impact on dual emissive lanthanide complexes for smart white LEDs and Molecular Thermometers; 46.46 L. [SERB-DST/CHY/F324/2022-23/G519].
18. Sudarsanam Putla; Catalytic production of bio-polymer precursors using active site-tailored zeolites; 34.69 L. [SERB/CHY/F292/2022-23/G510].
19. urajit Maity; Excited State Hydrogen Transfer in Microsolvated N-H Bearing Molecules: Determination of The Hydrogen Bonded Structures, Properties and Tautomerization Reaction Products; 10 L. [G269].
20. Surendra Kumar Martha; Fully Standalone type Photovoltaic fed Zero carbon battery charging station for institute's EVs (without grid connectivity); 29.52 L. [IITH/DES/F257/2022-23/G470].
21. Surendra Kumar Martha; Preparation of Working draft of the BIS standard for Requirements for communication protocol for Light EV(LEV) Battery Swap; 1.92 L. [ARCI/EE/F150/2022-23/G476].
22. Tarun Kanti Panda; Development of Earth-abundant Metal catalyzed Hydrosilylation of unsaturated compounds for the synthesis of functional materials; 45.71 L. [SERB/CE/F038/2022-23/G513].
23. Tarun Kanti Panda; Production of Polycarbonates as an alternative to engineering plastic employing bio-based monome; 20 L. [JICA-Friendship 2.0].
24. Venkat Rao Kotagiri; Harnessing pure spin current by tailoring molecular spinterface; 30.03 L. [BRNS/2022-23/G472].
25. Venkat Rao Kotagiri; Investigation of dispersion-driven cooperative supramolecular polymerization in organic semiconductors using high performance computing and experiments; 12.65 L. [SERB/CHY/F203/2022-23/G518].

Awards & Recognitions:

1. Deepa M has been inducted as a Member of the Expert Committee on Clean Energy for Greener Future for Science 20 in India 2023: S-20 for G-20 Secretariat.
2. Deepa M is continuing as Member of Selection Committee for DST Inspire Faculty (Materials Science)
3. Deepa M has been inducted as a Board Member for School of Chemistry, University of Hyderabad.
4. Deepa M has been Ranked 124 among Indian Scientists in Materials Science by Research.com in 2022.
5. Narendra Kurra received Rising Star of Science Award 2022 by Research.com.
6. Priyadarshi Chakraborty received the Ramanujan Fellowship.
7. Sivakumar V has received the SERB International Research Experience (SIRE) Fellowship to conduct research at Kyushu University with Prof C Adachi.
8. Sudarsanam Putla has been elected as an Early Career Board Member of Molecular Catalysis Journal (Elsevier, IF: 5.062).
9. Sudarsanam Putla has been elected as a Guest editor for a special issue (Title: Analysis of solid-liquid interfaces in heterogeneous catalysis) in the Catalysis Communications journal (Elsevier, IF: 3.51).
10. Sudarsanam Putla edited a book (Title: Heterogeneous Nanocatalysis for Energy and Environmental Sustainability) in Wiley.

11. Sudarsanam Putla has been elected as the Scientific Advisor Committee, Environment, and Sustainability Event, November, 2022, Indian National Science Academy, Delhi.
12. Tarun Kanti Panda received the Research Excellence Award 2022 from IIT Hyderabad.

Highlights:

Inauguration of Department of Chemistry Facility:

A perfect illustration of Modernistic Infrastructure and Cutting - Research Facilities, the Chemistry Department Building inaugurated by Distinguished Professor Govardhan Mehta at IIT Hyderabad. The building is a (G+5) structure with a built-up area of 10,063 sqm & a floor plate area of 2,146 sqm. Another day to be framed in the historical journey of IIT Hyderabad (IITH) when a perfect illustration of Modernistic Infrastructure and Cutting-Research Facilities, the Chemistry Department Building inaugurated by Professor Govardhan Mehta, University Distinguished Professor & Dr Kallam Anji Reddy Chair, University of Hyderabad at IIT Hyderabad Chief Guest; in the august presence of beloved BoG Chairman Dr BVR Mohan Reddy as Guest of Honor; hosted by Prof BS Murty Director, Deans, HoDs, Faculty, Staff & Students of IIT Hyderabad. The infrastructure inaugurated today is a part of the campus development project under the broader India-Japan collaboration through the JICA. Prof G Satyanarayana, HoD - Chemistry, introduced the Chief Guest, and the event concluded with a Vote-of- thanks, by Prof KVLS Subramaniam, Dean (Planning).

Read more: <https://pr.iith.ac.in/pressrelease/CDB.pdf>

THE HANS INDIA

Chemistry dept building at IIT-H inaugurated

G+5 building has built-up area of 10,063 sqm; floor plate area of 2,146 sqm

HANS NEWS SERVICE
HYDERABAD

IN a bid to add modern infrastructure and cutting-research facilities, the Chemistry department building at IIT-Hyderabad was inaugurated by Prof. Govardhan Mehta, University Distinguished Professor, Dr Kallam Anji Reddy, Chair, the University of Hyderabad at IIT-H was the chief guest.

An IIT-H release said on Thursday that the infrastructure inaugurated is part of the campus development project under the broader India-Japan collaboration through the JICA.

Congratulating IIT-H, Prof. Mehta said, "We exist, thanks to molecules like ammonia, and as a chemist, we should see what, why and how systems can be adopted in Chemistry to ensure a sustainable future. I urge all of you, being in this privileged place of interdisciplinary nature, to do your bit to contribute to India's goal of being Carbon Neutral by 2070."

Expressing his joy, guest of honour Dr BVR Mohan Reddy, Board of Governors, IIT-H, said, "We should have



an attitude to do research and publication that is the result and application-oriented, aligns with future and benefits society at large.

Welcoming the gathering, Prof B S Murty, director of IIT-H, said, "with 280 enthusiastic faculty and excellent students, IIT-H has been doing exceedingly well in academics and research, which is reflected in terms of various rankings. I am delighted that the construction activity of Phase II is going well; the Department of Chemistry has got its new building ready for occupation. I congratulate the department and wish that they grow significantly in the near future in terms of research, technology development and new academic programmes." Prof G Satyanarayana, HoD, Chemistry, introduced the chief guest. Prof KVLS Subramaniam, Dean (Planning), proposed a vote of thanks.

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Department of Chemistry Facility

Department of Civil Engineering

Welcome to the Department of Civil Engineering at IIT Hyderabad, one of the largest departments with 370 enrolled students and 27 active faculty members, including three adjuncts and three distinguished faculties. We also have a dedicated team of 7 Technical Superintendents (TS) and 3 Junior Technicians (JTs), along with one Executive Assistant.

Our department boasts five specializations, each represented by faculties engaged in diverse areas of research. As of July 15th, the department has an impressive record of more than 1000 publications, with a departmental h-index of 59. We are actively involved in numerous projects, including 13 Grant-in and Sponsored projects valued at 17 Crores and 260 Consultancy projects worth 11.8 Crores during the last financial year.

In the previous academic year, we organized several outreach activities, including the Interpore Kimberly-Clark Lecture Series Talk by Prof Jacques M Huyghe. Our faculty members also conducted various workshops, such as the India-Japan workshop on "Seismic Vulnerability" by Prof Amirtham Rajagopal, the national level short course on "Understanding Structural Steel Design - A Stability Perspective" by Prof Mahendrakumar Madhavan, and the 14th International Precipitation Conference (IPC14): India virtual workshop organized by Dr Shruti Upadhyaya.

Our esteemed faculties are actively involved in editorial boards and are fellows in reputed organizations. For instance, Dr R Maheswaran has become an editorial board member in Earth Science Informatics Journal, Prof Amirtham Rajagopal serves as an Advisory Editorial Board Member in the International Journal of Impact Engineering, and Prof Mahendra K Madhavan has been elected as a Fellow of the Institution of Civil Engineers (ICE), London, UK, and the American Society of Civil Engineers (ASCE).

We take immense pride in our academic community and continuously strive to create an environment that fosters excellence in research, innovation, and education.

For more information, please visit: <https://civil.iith.ac.in/>



Civil Engineering Departments Building/ Academic Block - B

Faculty

Head of the Department



Suriya S Prakash

PhD - Missouri University of Science
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Professor

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Professor



Amirtham Rajagopal

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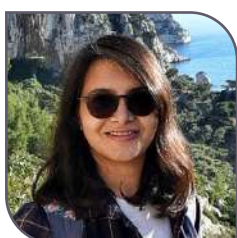
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Patents:

Filed:

1. Debraj Bhattacharyya; A Novel Anaerobic-Aerobic Algal-Bacterial Photo Bio-Reactor for wastewater Treatment; 202241048455.
2. T Shashidhar; A Non-Thermal Plasma Incinerator to Remove Dilute Volatile Organic Compounds in Indoor Concentrations; 202241039380.

Published:

1. Debraj Bhattacharyya; An Improved Sequential Batch Reactor for Wastewater Treatment; 202041031706.

Granted:

1. Subramaniam Kolluru V L; Lateral reinforcement system and method for concrete structures; 3001/CHE/2015.

Book Chapters:

1. Seetha N; Horta M J, Krishna Y S R, & Seetha N. (2022). Colloid Transport in Porous Media at Multiple Length Scales. Energy, Environment, and Sustainability, Springer, Singapore. https://doi.org/10.1007/978-981-16-8367-1_23.

Publications

1. Ambika S, Kumar M, Pisharody L, Malhotra M, Kumar G, Sreedharan V, Singh L, Nidheesh P V, & Bhatnagar A. (2022). Modified biochar as a green adsorbent for removal of hexavalent chromium from various environmental matrices: Mechanisms, methods, and prospects. Chemical Engineering Journal, 439. <https://doi.org/10.1016/j.ccej.2022.135716>.
2. Ambika S. (2022). Integrated sustainability impact assessment of trickling filter. Risk, Reliability and Sustainable Remediation in the Field of Civil and Environmental Engineering, undefined(undefined). <https://doi.org/10.1016/B978-0-323-85698-0.00003-4>.
3. Nippatlapalli N & Selvaraj A. (2022). A study on the removal of long chain perfluorodecanoic acid in simulated aqueous solution using enhanced electrochemical technique: Metabolites, kinetic and isotherm model analysis. Journal of Water Process Engineering, 49(undefined). <https://doi.org/10.1016/j.jwpe.2022.103045>.
4. Manish K, Ambika S, Aydin H, P V Nidheesh. (2022). Waste to catalyst: Role of agricultural waste in water and wastewater treatment, Science of The Total Environment, 26, 2022, 159762. <https://doi.org/10.1016/j.scitotenv.2022.159762>.
5. Pranavi D & Rajagopal A. (2022). Nonlocal Diffused Approach to Model Delamination in Composites. Lecture Notes in Mechanical Engineering, undefined(undefined). https://doi.org/10.1007/978-981-16-8724-2_13.
6. Dhaladhuli P, Amirtham R, & Reddy J N. (2022). Interaction between interfacial damage and crack propagation in quasi-brittle materials. Mechanics of Advanced Materials and Structures, 29(22). <https://doi.org/10.1080/15376494.2021.1891356>.
7. Pranavi D, Rajagopal A, & Reddy J N. (2022). A note on the applicability of Eringen's nonlocal model to functionally graded materials. Mechanics of Advanced Materials and Structures, undefined(undefined). <https://doi.org/10.1080/15376494.2022.2150340>.
8. Basak A, Amirtham R, & Basappa U. (2022). The use of contravariant tensor invariants to model damage in anisotropic soft tissues. Mechanics of Advanced Materials and Structures, 29(27). <https://doi.org/10.1080/15376494.2021.1963019>.
9. Basak A & Amirtham R. (2022). On the choice of mathematical functions to model damage in anisotropic soft tissues. Materials Today: Proceedings, 68(undefined). <https://doi.org/10.1016/j.matpr.2022.08.315>.
10. Karthik S, Nasedkina A, Nasedkin A, & Rajagopal A. (2022). Framework and Numerical Algorithm for a Phase Field Fracture Model. East Asian Journal on Applied Mathematics, 13(1). <https://doi.org/10.4208/eajam.280921.270722>.
11. Akshaya Gomathi K, Rajagopal A, & Suriya Prakash S. (2022). Predicting the failure mechanism of RC slabs under combined blast and impact loading. Theoretical and Applied Fracture Mechanics, 119. <https://doi.org/10.1016/j.tafmec.2022.103357>.
12. Balakrishnan B, Rajagopal A, & Raja S. (2022). Vibroacoustic performance assessment of aircraft panels in low, mid, and high-frequency regimes. Mechanics of Advanced Materials and Structures, 29(20). <https://doi.org/10.1080/15376494.2021.1882015>.
13. Chinthapalli H K & Agarwal A. (2022). Fire performance of earthquake-damaged reinforced concrete columns: an experimental study. Journal of Structural Fire Engineering, 13(1). <https://doi.org/10.1108/JSFE-03-2021-0015>.
14. Natesh P S, Agarwal A, & Choe L. (2022). Behavior and design of double angle beam-column connection in fire conditions. Fire Safety Journal, 134(undefined). <https://doi.org/10.1016/j.firesaf.2022.103707>.

15. Chinthapalli H K, Sharma S, & Agarwal A. (2022). Fire Behavior and Modeling of Short RC Columns in Pure Axial Compression: Role of Volume, Configuration, and Spacing of Lateral Reinforcement. *Journal of Structural Engineering (United States)*, 148(1). [https://doi.org/10.1061/\(ASCE\)ST.1943-541X.0003224](https://doi.org/10.1061/(ASCE)ST.1943-541X.0003224).
16. Bhatia M, Khan M L, & Qureshi A. (2022). Microbial remediation of mercury-contaminated soils. *Microbes and Microbial Biotechnology for Green Remediation*, undefined(undefined). <https://doi.org/10.1016/B978-0-323-90452-0.00039-6>.
17. Parmar J & Qureshi A. (2022). Accounting of the Use and Emissions of Polychlorinated Biphenyl Compounds (PCBs) in India, 1951-2100. *Environmental Science and Technology*, undefined(undefined). <https://doi.org/10.1021/acs.est.2c09438>.
18. Maheshwarkar P, Ralhan A, Sunder Raman R, Tibrewal K, Venkataraman C, Dhandapani A, Kumar R N, Mukherjee S, Chatterje A, Rabha S, Saikia B K, Bhardwaj A, Chaudhary P, Sinha B, Lokhande P, Phuleria H C, Roy S, Imran M, Habib G, Azharuddin Hashmi M, Qureshi A, Qadri A M, Gupta T, Lian Y, Pandithurai G, Prasad L, Murthy S, Deswal M, Laura J S, Chhangani A K, Najjar T A, & Jehangir A. (2022). Understanding the Influence of Meteorology and Emission Sources on PM_{2.5} Mass Concentrations Across India: First Results from the COALESCE Network. *Journal of Geophysical Research: Atmospheres*, 127(4). <https://doi.org/10.1029/2021JD035663>.
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20. Qureshi A. (2022). Mercury in the Environment Around Industrially Impacted Locations in India: A Mini-Review. *Bulletin of Environmental Contamination and Toxicology*, 109(6). <https://doi.org/10.1007/s00128-022-03548-w>.
21. Ray T, Khan M L, Qureshi A, & Verma S. (2022). MODIS-Derived Fire Characteristics and Greenhouse Gas Emissions from Cropland Residue Burning in Central India. *Sustainability (Switzerland)*, 14(24). <https://doi.org/10.3390/su142416612>.
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4. Amirtham Rajagopal; Nonlocal damage models for concrete under quasistatic and dynamic loads; 18.55 L. [DST/JSPS].
5. Amirtham Rajagopal; A thermodynamically consistent model for evolution of hydride precipitate in zirconium and its alloy; 22 L. [BRNS/CE/F050/2022-23/G484].
6. Amirtham Rajagopal; Nonlocal Approach for Modeling Delamination in Composites; 40 L. [DRDO/CE/F050/2022-23/G469].
7. Anil Agarwal; Substitution of Reinforced Concrete in Bridge Deck Construction with Lightweight High-Performance Composite Material; 55 L. [NHAI/CE/F036/2022-23/G 480 I].
8. Asif Qureshi; Reimagining the Good City from Ennore Creek, Chennai; 0.29 L. [Westminster/CE/F116/2022-23/S229].
9. B Munwar Basha; Development of Design Guidelines for Narrow Backfill Width Mechanically Stabilized Earth Walls built; 49.13 L. [NHAI/CE/F118/2022-23/G480F].
10. B Umashankar; Advanced numerical models to simulate different transportation infrastructure systems with focus on geosynthetic reinforced back-to-back walls and geosynthetic reinforced integral bridge structure; 28 L. [NHAI/CE/F036/2022-23/G 480 E].
11. B Umashankar; Laboratory and field investigations on geosynthetic reinforced unpaved and paved roads overlying soft subgrades Laboratory and field investigations on geosynthetic reinforced unpaved and paved roads overlying soft subgrades; 80 L. [CEFIPRA (Indo-French)].
12. B Umashankar; Use of slag and C&D wastes as bases/subbases of pavements or as fill materials in conjunction with geosynthetics; 76 L. [NHAI/CE/F036/2022-23/G480D].
13. B Umashankar; Use of slag and C&D wastes as bases/subbases of pavements or as fill materials in conjunction with geosynthetics; 84 L. [NHAI/CE/F036/2022-23/G 480 D].
14. Biswarup Bhattacharyya; Towards data-driven Digital Twin by Bayesian; 25 L. [SG/IITH/F299/2022-23/SG-141].
15. Debraj Bhattacharyya; Understanding the Fate and Effects of Pharmaceutically Active Compounds, Per- and Polyfluoroalkyl Su; 8 L. [AC2022-10].
16. Debraj Bhattacharyya; Improving the Nutrient and Micropollutant Removal Efficiency of Johkasou under Indian Conditions; 21.1 L. [IC2023-1].

Funded Research Projects:

1. Ambika S; Application and LCA of Agriculture Waste-based Biochar in Water Treatment; 8 L. [1].
2. Amirtham Rajagopal; Microstructural evolution and damage in materials using a phase field approach; 35 L. [DST/CRG].
3. Amirtham Rajagopal; Non-Local Phase field approach to modelling delamination in high strength composite rocket motor casing; 33 L. [ASL-DRDO/CE/F050/2022-23/S249].
4. Amirtham Rajagopal; Nonlocal damage models for concrete under quasistatic and dynamic loads; 18.55 L. [DST/JSPS].
5. Amirtham Rajagopal; A thermodynamically consistent model for evolution of hydride precipitate in zirconium and its alloy; 22 L. [BRNS/CE/F050/2022-23/G484].
6. Amirtham Rajagopal; Nonlocal Approach for Modeling Delamination in Composites; 40 L. [DRDO/CE/F050/2022-23/G469].
7. Anil Agarwal; Substitution of Reinforced Concrete in Bridge Deck Construction with Lightweight High-Performance Composite Material; 55 L. [NHAI/CE/F036/2022-23/G 480 I].
8. Asif Qureshi; Reimagining the Good City from Ennore Creek, Chennai; 0.29 L. [Westminster/CE/F116/2022-23/S229].
9. B Munwar Basha; Development of Design Guidelines for Narrow Backfill Width Mechanically Stabilized Earth Walls built; 49.13 L. [NHAI/CE/F118/2022-23/G480F].
10. B Umashankar; Advanced numerical models to simulate different transportation infrastructure systems with focus on geosynthetic reinforced back-to-back walls and geosynthetic reinforced integral bridge structure; 28 L. [NHAI/CE/F036/2022-23/G 480 E].
11. B Umashankar; Laboratory and field investigations on geosynthetic reinforced unpaved and paved roads overlying soft subgrades Laboratory and field investigations on geosynthetic reinforced unpaved and paved roads overlying soft subgrades; 80 L. [CEFIPRA (Indo-French)].
12. B Umashankar; Use of slag and C&D wastes as bases/subbases of pavements or as fill materials in conjunction with geosynthetics; 76 L. [NHAI/CE/F036/2022-23/G480D].
13. B Umashankar; Use of slag and C&D wastes as bases/subbases of pavements or as fill materials in conjunction with geosynthetics; 84 L. [NHAI/CE/F036/2022-23/G 480 D].
14. Biswarup Bhattacharyya; Towards data-driven Digital Twin by Bayesian; 25 L. [SG/IITH/F299/2022-23/SG-141].
15. Debraj Bhattacharyya; Understanding the Fate and Effects of Pharmaceutically Active Compounds, Per- and Polyfluoroalkyl Su; 8 L. [AC2022-10].
16. Debraj Bhattacharyya; Improving the Nutrient and Micropollutant Removal Efficiency of Johkasou under Indian Conditions; 21.1 L. [IC2023-1].

17. Digvijay S Pawar; Crash data collection & Reconstruction in India; 45 L. [Toyota/Honda/CE/F175/2022-23/S248].
18. K B V N Phanindra; Characterizing Hydrogeology of Fractured Granite Aquifers using Experimental and Numerical Studies; 53.73 L. [SERB/CE/F070/2022-23/G474].
19. Maheswaran Rathinasamy; Understanding the impact of climate change on groundwater resources in Ganges River Basin; 54 L. [INDO CANADA DST Project-Sanctioned].
20. Maheswaran Rathinasamy; AMOTHEC-Anomalous Water Transport and precipitation extreme events; 0 L. [DST (CNA-SERB)/CE/F276/2022-23/G481].
21. Meenakshi; white cement, having properties of better workability and good compressive strength for decorative purpose; 8 L. [DCPL/CE/F310/2022-23/S265].
22. Mullapudi Ramya Sri; Grant in Aid Project: Self-healing characteristics of WMA mixtures; 32.78 L. [G417].
23. Pritha Bhattacharya; Emission reduction and energy economy by electric vehicle on Indian roads-driving cycle based study; 5.7 L. [EMPRI/CE/F212/2022-23/S261].
24. Pritha Bhattacharya; Microalgae-microbial fuel cell (mMFC): an integrated process for removal of xenobiotics in sewage and simultaneous electricity generation; 2 L.
25. Roshan Khan; Innovation of a 4-Dimensional High-Speed Train Simulator Facility for Investigations on Passenger Railcar Vibrations; 25 L. [SG/IITH/F274/2022-23/SG-112].
26. S Sireesh; Design Development of Fly ash Geopolymer Stabilized Marginal Aggregate Base Courses for Flexible Pavements; 91.8 L. [NHAI/CE/F036/2022-23/G 480 B].
27. S Sireesh; Laboratory and Field Investigation on PET Geogrid-Reinforced Base/Sub base Courses; 227.55 L. [STRATA-MoT/CE/F036/2022-23/G464].
28. S Sireesh; Performance of Geosynthetic-Interlayered Asphalt Layers and Overlays; 52.6 L. [NHAI/CE/F036/2022-23/G 480 A].
29. S Sireesh; Investigation of Geocomposites as a Replacement of GSB Layer; 66.8 L. [NHAI/CE/F036/2022-23/G 480 C].
30. Surendra Nadh Somala; India Science and Research Fellowship 2021-22; 2 L. [GOI/CE/F155/2022-23/G508].
31. Suvin P V; Development of a Novel Geometric Design Consistency Evaluation Module using Proactive Safety Assessment; 30 L. [SG142].

Awards & Recognitions

1. Asif Qureshi and collaborators received the international grant awarded by the British Academy, UK.
2. B Munwar Basha has been nominated by the Indian Geotechnical Society (IGS) to represent IGS on the International Technical Committee TC-302 on "Forensic Geotechnical Engineering" of the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE) for the term 2022-2025.
3. Soujanya Dabbiru, working under the guidance of B Munwar Basha has received the Springer Best Paper Award for the paper presented in IGC 2022.
4. B Umashankar has been nominated to represent the Indian Geotechnical Society (IGS) on the International Technical Committee TC-202 on "Transportation Geotechnics" of the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE) for the term 2022-2025.
5. B Umashankar has been the UGC nominee on governing body of Government Degree College, Siddipet, Medak, Telangana (a college affiliated to Osmania Univ.).
6. Baadiga Ramu, who worked under the guidance of Sireesh Saride and Umashankar B was appointed as an assistant professor at IIT Patna.
7. B Umashankar has been nominated as Chair, Groundwork, Deep Foundations Institute for the term 2022-2023.
8. Mahendrakuma Madhavan received the HUDCO Design Awards 2021-22.
9. Mahendrakumar Madhavan Elected as a Fellow of the Institution of Civil Engineers (ICE) London and the American Society of Civil Engineers (ASCE).
10. Mr Gaurav Chobe, who worked under the guidance of Mahendrakumar Madhavan & Prof Suriya Prakash received the Estus H and Vashti L Magoon Award for Excellence in Teaching from Purdue University's College of Engineering, for the 2022.
11. Meenakshi received the Faculty of Engineering and Information Technology (FEIT) Incoming Visiting Research Fellowship-2023.
12. Sireesh S received the IGS-Shri A G Dastidar Biennial Best Paper Award 2022.
13. Sireesh S was selected as a recipient of the prestigious

Australian Awards Fellowship 2023.

14. Y Sai Rama Krishna, PhD student of Seetha N, received the Research Excellence Award, April 2023, IIT Hyderabad.
15. Shashidhar T and collaborators were honored with "The Award for International Collaboration of the Year 2022," widely recognized as the 'Oscars of higher education' in the UK.
16. Shwetabh Yadav received the Teaching Excellence Award.
17. Surendra Nadh Somala received the Faculty Research Excellence Award 2022-23.

Research Highlights

1. Lightweight High-performance composites - Dr Anil Agarwal

- A prototype bridge with 9-m span was built and tested.
- Total 12 portable lightweight segments.
- Bolted field joints.
- The bridge can be launched from one side of a trench.
- Can support up to 3.5 times its self-weight, i.e., Maruti Gypsy or a similar vehicle.
- Tested for 20,000 cycles of service level loads.
- Inaugurated by Sri Rajnath Singh Ji (Hon. Defense Minister) on Aug 13, 2020.



2. Developing Algal-Bacterial Hybrid Systems for Wastewater Treatment - Dr Debraj Bhattachayya

High-rate Wastewater treatment systems can be developed by utilizing the symbiotic association between microalgae and heterotrophic microorganisms. Such systems are capable of removing BOD, COD, suspended solids, nutrients, and even micropollutants from wastewater. The treated effluents can be used for non-potable purposes. These hybrid systems have less carbon footprint, and treatment can be achieved at a lesser cost using less energy input. Two prototypes have been successfully developed. One of the prototypes has also been implemented at full scale.



3. Mining Induced Seismicity - Dr Surendra Nadh Somala

Mining Induced Seismicity by Surendra Nadh Somala, in Collaboration with Dr Hiroshi Ogasawara in an ICDP seismological project in South Africa.

Drilling into seismogenic zones of M2-5.5 earthquakes (DSeis)' project (2015).

International Continental Scientific Drilling Program (ICDP).

Japan, South Africa, US, Germany, France, UK, India, Switzerland, Australia, Israel.



Department of Computer Science and Engineering

The Computer Science and Engineering (CSE) department has been growing steadily since its inception in 2008 and is one of the most sought-after destinations for incoming students as well as faculty. The department faculty comprises 26 faculty members with a good representation in the areas of theoretical computer science, artificial intelligence/machine learning, and computer systems areas. The CSE department has graduated around 60 PhDs, with many of the PhD graduates taking positions in top R&D labs and academic institutes - six of our PhD graduates have taken up faculty positions at other IITs. The department faculty and students consistently publish in top-tier conferences and journals. The undergraduate program has been consistently preferred by the top-ranked JEE performers - as evidenced by the improving opening and closing ranks. Our industry engagement has also been very strong with the MTech in Data Science (MDS) program, providing an opportunity for industry professionals to stay up-to-date with the latest R&D developments in the area of data science.

The CSE department also collaborates with various other industry and R&D labs, including Samsung, Intel, Microsoft, Google, AMD, DRDO, Honeywell, KLA, IBM, Adobe, Suzuki Motors, Fujitsu AI, and Weather News Inc., to name a few. The department faculty members routinely engage with other colleges and institutions by giving invited lectures and also serving in positions of advisory capacity on the Board of Studies and Board of Governors.

For more information, please visit: <https://cse.iith.ac.in/>

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Profile page:<https://www.microsoft.com/en-us/research/people/adityan/>**Kenzo FUJISUE**

Member of the House of Councilors in the Diet (the national legislature of Japan)

Profile page:**Visiting Professor****C Siva Ram Murthy**

Visiting Professor, IIT Hyderabad

Profile page:<https://iith.ac.in/cse/murthy/>**Patents:****Filed:**

1. Bheemarjuna Reddy Tamma; Method and System for Privacy-Preserving Continuous Internet Forensics; 202241035158.

Published:

1. Antony Franklin, Bheemarjuna Reddy Tamma; Method and System for Dynamic Selection of Functional Split for Cloud Radio Access Networks; 202041036210.
2. Antony Franklin, Bheemarjuna Reddy Tamma; System and Method for Performing Efficient Scheduling in Cloud Radio Access Network; 202141020062.

3. Vineeth N Balasubramanian; A Methodology for Transfer of Knowledge from Data-rich Domains for Thermal Image Processing; 202011032663.
4. Vineeth N Balasubramanian; System and Method for Instance-Specific Feature AI; India: 202241027805; USA: 18/197,075.
5. Vineeth N Balasubramanian; System and Method for Generating Derained Image us; India: 202241023945; USA: 18/138,060.

Publications:

1. Chintapalli V R, Adeppady M, Tamma B R, & Antony Franklin A. (2022). Restrain: A dynamic and cost-efficient resource management scheme for addressing performance interference in NFV-based systems. *Journal of Network and Computer Applications*. <https://doi.org/10.1016/j.jnca.2021.103312>.
2. Inukonda M S, Karpate A R, Tamma B R, Mittal S, & Tammana P. (2022). Nascent: A Non-Invasive Solution for Detecting Utilization of Servers in Bare-Metal Cloud. *IEEE Access*. <https://doi.org/10.1109/ACCESS.2022.3145955>.
3. Aveen Dayal, M Aishwarya, S Abhilash, C Krishna Mohan, Abhinav Kumar, Linga Reddy Cenkeramaddi. (2022). Adversarial Unsupervised Domain Adaptation for Hand Gesture Recognition using Thermal Images in *IEEE Sensors Journal*, Vol: 23, PP: 3493 - 3504, 2022. <https://doi.org/10.1109/JSEN.2023.3235379>.
4. Prudviraj Jeripothula, Chalavadi Vishnu, and C Krishna Mohan. (2022). M-FFN: Multi-Scale Feature Fusion Network for Image Captioning. *Applied Intelligence* (Springer). <https://doi.org/10.1007/s10489-022-03463-x>.
5. Anushka Joshi, Chalavadi Vishnu, Krishna Mohan. (2022). Early detection of earthquake magnitude based on stacked ensemble model. *Journal of Asian Earth Sciences* (Elsevier), pp. 100122, ISSN 2590-0560. <https://doi.org/10.1016/j.jaesx.2022.100122>.
6. Yenduri S, Perveen N, Chalavadi V, & C K M. (2022). Fine-grained action recognition using dynamic kernels. *Pattern Recognition*, 122(undefined). <https://doi.org/10.1016/j.patcog.2021.108282>.
7. Prudviraj Jeripothula, Chalavadi Vishnu, & C Krishna Mohan. (2022). AAP-MIT: Attentive Atrous Pyramid Network and Memory Incorporated Transformer for Multi-Sentence Video Description. *IEEE Transactions on Image Processing*. <https://doi.org/10.1109/TIP.2022.3195643>.
8. Subhrajit Nag, Dhruv Makwana, Sai Chandra Teja R, Sparsh Mittal, and C Krishna Mohan. (2022). WaferSegClassNet - A Light-weight Network for Classification and Segmentation of Semiconductor Wafer Defects. *Computers in Industry journal* (Elsevier), pp. 1-10. ISSN 0166-3615. <https://doi.org/10.1016/j.compind.2022.103720>.
9. Onkar Susladkar, Gayatri Deshmukh, Subhrajit Nag, Ananya Mantravadi, Dhruv Makwana, Sujitha Ravichandran, Sai Chandra Teja R, Gajanan H Chavhan, C Krishna Mohan, and Sparsh Mittal. (2022). ClarifyNet: A High-Pass and Low-Pass Filtering Based CNN for Single Image Dehazing. *Journal of Systems Architecture* (Elsevier). <https://doi.org/10.1016/j.sysarc.2022.102736>.
10. Perveen N, Mohan C K, & Chen Y W. (2022). Expression Modeling Using Dynamic Kernels for a Quantitative Assessment of a Facial Paralysis. *Communications in Computer and Information Science*, 1474 CCIS(undefined). https://doi.org/10.1007/978-3-030-94893-1_17.
11. Chalamala Srinivasa R, K Naveen Kumar, Singh Ajeet, Saibewar Aditya, and C Krishna Mohan. (2022). Federated learning to comply with data protection regulations. *CSI Transactions on ICT* (Springer Nature). <https://doi.org/10.1007/s40012-022-00351-0>.
12. Chalavadi Vishnu, Vineel Abhinav, Debaditya Roy, Sobhan Babu, and C Krishna Mohan. Improving Multi-agent Trajectory Prediction using Dynamic Traffic States on Interactive Driving Scenarios. Accepted in *IEEE Robotics and Automation Letters*, Early Access, pp. 1-8, Feb. 2023. <https://doi.org/10.1109/LRA.2023.3258685>.
13. Dhruv Makwana, Subhrajit Nag, Onkar Susladkar, Gayatri Deshmukh, Sai Chandra Teja R, Sparsh Mittal, C Krishna Mohan. (2022). ACLNet: An Attention and Clustering-based Cloud Segmentation Network. *International Journal of Remote Sensing* (Taylor and Francis). <https://doi.org/10.1080/2150704X.2022.2097031>.
14. Chalavadi V, Jeripothula P, Datla R, Ch S B, & C K M. (2022). mSODANet: A network for multi-scale object detection in aerial images using hierarchical dilated convolutions. *Pattern Recognition*, 126(undefined). <https://doi.org/10.1016/j.patcog.2022.108548>.
15. Jacob A, Panolan F, Raman V, & Sahlot V. (2022). Structural Parameterizations with Modulator Oblivion. *Algorithmica*, 84(8). <https://doi.org/10.1007/s00453-022-00971-7>.
16. Lokshantov D, Mouawad A E, Panolan F, & Siebertz S. (2022). On the Parameterized Complexity of Reconfiguration of Connected Dominating Sets. *Algorithmica*, 84(2). <https://doi.org/10.1007/s00453-021-00909-5>.
17. Agrawal A, Kanesh L, Panolan F, Ramanujan M S, & Saurabh S. (2022). A Fixed-Parameter Tractable Algorithm for Elimination Distance to Bounded Degree Graphs. *SIAM Journal on Discrete Mathematics*, 36(2). <https://doi.org/10.1137/21M1396824>.
18. Banerjee S, Mathew R, & Panolan F. (2022). Target Set Selection Parameterized by Vertex Cover and More. *Theory of Computing Systems*, 66(5). <https://doi.org/10.1007/s00224-022-10100-0>.

19. Agrawal A, Misra P, Panolan F, & Saurabh S. (2022). Fast Exact Algorithms for Survivable Network Design with Uniform Requirements. *Algorithmica*, 84(9). <https://doi.org/10.1007/s00453-022-00959-3>.
20. Prashanth Podili, Sumanth Reddy Cherupall, Srinivas Boga, and Kotaro Kataoka. (2022). Inter-domain prefix and route validation using fast and scalable DAG based distributed ledger for secure BGP routing. *Special Issue on Blockchains and Distributed Ledgers in Network and Service Management, Springer's Journal of Network and Systems Management*, Vol.30, No.4, Pages.55, 2022. <https://doi.org/10.1007/s10922-022-09668-2>.
21. Adeeba Naaz, T V Pavan Kumar B, Maria Francis, and Kotaro Kataoka. (2022). Integrating Threshold Opening with Threshold Issuance of Anonymous Credentials over Blockchains for a Multi-certifier Communication Model. *IEEE Access*, Vol.10, pp.128697-128720, 2022. <https://doi.org/10.1109/ACCESS.2022.3225439>.
22. Pragati Shrivastava and Kotaro Kataoka. (2022). Topology Poisoning Attacks and Prevention in Hybrid Software-Defined Networks. *IEEE Transactions on Network and Service Management*, Vol.19, No.1, pp.510-523, 2022. <https://doi.org/10.1109/TNSM.2021.3109099>.
23. Yuka Kataoka, Achmad Husni Thamrin, Rodney Van Meter, Jun Murai, and Kotaro Kataoka. (2022). Investigating the effect of computer-mediated feedback via an LMS integration in a large-scale Japanese-speaking class. *Education and Information Technologies*, Vo.28, No.2, pp.1957-1986, 2022. <https://doi.org/10.1007/s10639-022-11262-7>.
24. Krishna V Palem, Duc Hung Pham, M V Panduranga Rao. (2022). Quantum learning of concentrated Boolean functions. *Quantum Inf. Process.* 21(7): 256. <https://doi.org/10.1007/s11128-022-03607-5>.
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27. Madisetty S, & Desarkar M S. (2022). A reranking-based tweet retrieval approach for planned events. *World Wide Web*, 25(1). <https://doi.org/10.1007/s11280-021-00962-8>.
28. Aravind N R & Maniyar U. (2022). Planar projections of graphs. *Discrete Applied Mathematics*, 319(undefiend). <https://doi.org/10.1016/j.dam.2021.08.015>.
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46. Gupta R, Srijith P K, & Desai S. (2022). Galaxy morphology classification using neural ordinary differential equations. *Astronomy and Computing*, 38(undefined). <https://doi.org/10.1016/j.ascom.2021.100543>.
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Funded Research Projects:

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2. C Krishna Mohan; Earthquake Early Warning System (EEWS) Using Deep Learning Approaches; 35 L. [MOES/CSE/F016/2022-23/G493].
3. C Krishna Mohan; Earthquake Early Warning System (EEWS) Using Deep Learning Approaches; 35 L. [MOES/CSE/F016/2022-23/G493].
4. C Krishna Mohan; Smart Cities for Emerging Countries Based on Sensing, Network, and Big Data Analysis of Multimodal Regional Transport System (M2Smart) Funded by JICA / JST SATREPS; 3000 L. [JICA/CSE/F016/2022-23/S220].
5. C Krishna Mohan; Computer-Aided Diagnosis of Liver Cancer using Weakly-Supervised Deep Learning incorporated with Computational Anatomic Models, Funded by JSPS (KAKEN), Japan; 100.04 L. [JSPS/CSE/F016/2022-23/S220].
6. C Krishna Mohan; Design and development of machine learning algorithms for traffic analytics, Funded by DST-SERB Core Research Grant; 36.05 L. [DST-SERB/CSE/F016/2022-23/S220].
7. C Krishna Mohan; Design and development of machine learning algorithms for road hazard detection, Funded by Hyundai Mobis, India; 21.24 L. [Hyundai Mobis/CSE/F016/2022-23/S220].
8. C Krishna Mohan; Computer vision, optics and the Algorithms involved in the Hangar Design; 17.7 L. [INNOMINDS/CSE/F016/2022-23/S220].
9. C Krishna Mohan; LiDAR and camera sensors data based deep learning algorithm for autonomous driving system; 23 L. [SERB/CSE/F016/2022-23/S220].
10. Kotaro Kataoka; ColdChain; 16.1 L. [Denso/CSE/F005/2020-21/S128].
11. Kotaro Kataoka; Fundamental Researches on the Interoperability of Blockchain Platform; 18.87 L. [Denso/CSE/F005/2021-22/S182].
12. M V Panduranga Rao; Assistive Software for auditing the security of quantum communication equipment; 14.73 L. [QSIPL/CSE//F010/2022-23/S260].

39. Majumder A & Mathew R. (2022). Local boxicity and maximum degree. *Discrete Mathematics*, 345(12). <https://doi.org/10.1016/j.disc.2022.113085>.
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41. Bisht B, & Das S. (2022). BHT-NoC: Blaming Hardware Trojans in NoC Routers. *IEEE Design and Test*, 39(6). <https://doi.org/10.1109/MDAT.2022.3202998>.
42. Agarwalla B, Das S, & Sahu N. (2022). Process variation aware DRAM-Cache resizing. *Journal of Systems Architecture*, 123(undefined). <https://doi.org/10.1016/j.sysarc.2021.102364>.
43. Kumar S, Sinha P, & Das S. (2022). WinDRAM: Weak rows as in-DRAM cache. *Concurrency and Computation: Practice and Experience*, 34(28). <https://doi.org/10.1002/cpe.7350>.
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53. Shwetha Vittal, A Antony Franklin: HARNESS: High Availability Supportive Self Reliant Network Slicing in 5G Networks. *IEEE Trans. Netw. Serv. Manag.* 19(3): 1951-1964 (2022).
54. Shashwat Kumar, Lalit Bhagat, A Antony Franklin, Jiong Jin: Multi-neural network based tiled 360° video caching with Mobile Edge Computing, *J Netw. Comput. Appl.* 201: 103342 (2022).
55. Venkatarami Reddy Chintapalli, Madhura Adeppady, Bheemarjuna Reddy Tamma, A. Antony Franklin: RESTRAIN: A dynamic and cost-efficient resource management scheme for addressing performance interference in NFV-based systems, *J. Netw. Comput. Appl.* 201: 103312 (2022).

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5. C Krishna Mohan; Computer-Aided Diagnosis of Liver Cancer using Weakly-Supervised Deep Learning incorporated with Computational Anatomic Models, Funded by JSPS (KAKEN), Japan; 100.04 L. [JSPS/CSE/F016/2022-23/S220].

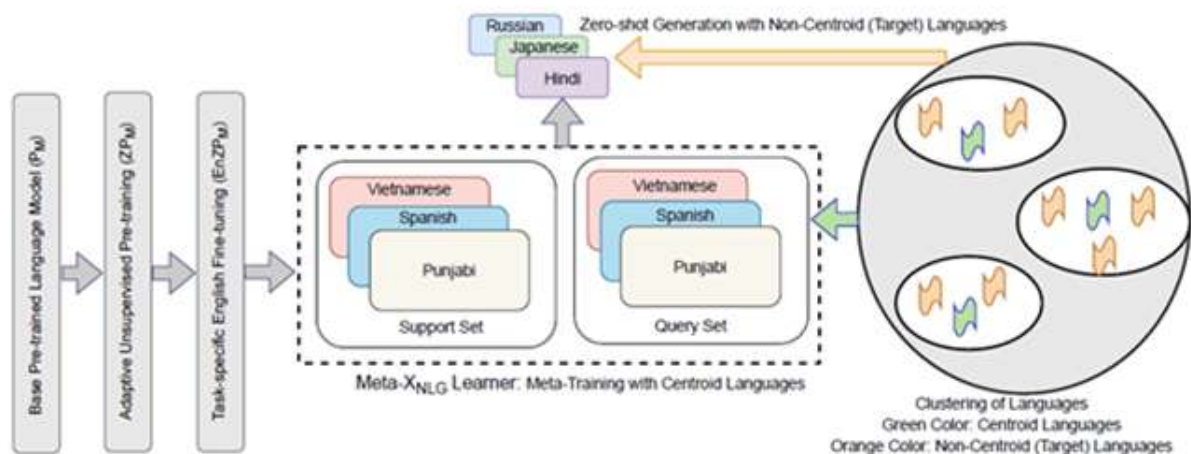
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7. C Krishna Mohan; Design and development of machine learning algorithms for road hazard detection, Funded by Hyundai Mobis, India; 21.24 L. [Hyundai Mobis/CSE/F016/2022-23/S220].
8. C Krishna Mohan; Computer vision, optics and the Algorithms involved in the Hangar Design.; 17.7 L. [INNOMINDS/CSE/F016/2022-23/S220].
9. C Krishna Mohan; LiDAR and camera sensors data based deep learning algorithm for an autonomous driving system; 23 L. [SERB/CSE/F016/2022-23/S220].
10. Kotaro Kataoka; ColdChain; 16.1 L. [Denso/CSE/F005/2020-21/S128].
11. Kotaro Kataoka; Fundamental Researches on the Interoperability of Blockchain Platform; 18.87 L. [Denso/CSE/F005/2021-22/S182].
12. M V Panduranga Rao; Assistive Software for auditing the security of quantum communication equipment; 14.73 L. [QSIPL/CSE//F010/2022-23/S260].
13. Maunendra Sankar Desarkar; Non-Toxic Multi-lingual Personalized Auto-suggest Generation; 17.7 L. [Microsoft/CSE/F158/2022-23/S236].
14. Maunendra Sankar Desarkar; HateSpread: Analyzing the Spread of Hatred in Online Social Discussions; 6.6 L. [SERB/CSE/F158/2021-22/G442].
15. Maunendra Sankar Desarkar; Generating Individual Row Description from Tables; 10 L. [TREDENCE/CSE/F158/2022-23/S225].
16. N R Aravind; Geometric Obnoxious Facility Location Optimization; 10.05 L. [SERB/CSE/F104/2022-23/G509].
17. Praveen Aravind Babu Tammana; Debugging Performance Issues in Microservices Applications (Academic award with no instructions) (USD 3000); 2.37 L. [IBM/CSE/F242/2022-23/S237].
18. Rajesh Kedia; Efficient Management of Shared Resources for Edge Systems Executing Concurrent DNNs; 20.27 L. [SERB/CSE/F278/2022-23/G499].
19. Rameshwar Pratap Yadav; A new metric to compare matrices and sublinear search; 30 L. [SG/IITH/F308/2022-23/SG-144].
20. Sathya Peri; An Efficient Non-Blocking Framework for Large-Scale GraphAnalytics; 28.09 L. [SERB/CSE/F137/2022-23/G542].
21. Sathya Peri; An Efficient Framework for Simulating Blood Flow in a Stenosed Channel (PR No: PR41173); 0 L. [DBT/CHE/F045/2022-23/G486].
22. Sathya Peri; Efficient Smart Contract Framework for Tezos Blockchain Ecosystem; 89.43 L. [CEFIPRA/IFCPAR/CSE/F137/2022-23/G539].
23. Sathya Peri; Parallelization of Smart Contract Execution in Tezos Blockchain (USD 9,225); 0.09 L. [TEZOS/CSE/F137/2022-23/S198].
24. Shirshendu Das; Efficient utilization and Refresh overhead Minimization of eDRAM based Last Level Cache; 9.76 L. [SERB/CSE/F330/2022-23/G541].
25. Srijith P K; Continual learning for vision and language; 53.19 L. [SRIPL/CSE/F184/2022-23/S246].
26. Srijith P K; Bayesian Causal learning; 20 L. [JICA].
27. Srijith P K; Deep learning for Telemetry data; 5.17 L. [INTEL/CSE/F184/2022-23/S250].
28. Subrahmanyam Kalyanasundaram; Conflict-Free Coloring of Graphs and Related Problems; 22.81 L. [SERB/CSE/F081/2022-23/G524].
29. Vineeth N Balasubramanian; Learning in the Presence of Strategic Agents; 550; [SERB-CRG/AI/F293/2022-23/G532].
30. Vineeth N Balasubramanian; Deep Learning R&D; 7.2655; [SONY/CSE/F121/2022-23/C1042].
31. Vineeth N Balasubramanian; Research on the viability of deep learning-based techniques on BBP images and Data; 207.26; [KLA/CSE/F121/2020-21/S143].
32. Vineeth N Balasubramanian; Development of Real-time Video Perception capabilities Capabilities for an Autonomous Robot; 26720; [RCI DRDO/EE/F100/2022-23/S231].
33. Vineeth N Balasubramanian; Algorithmic Recourse for Actionable Explanations in AI Models; 17.7267; [Microsoft/CSE/F121/2022-23/S241].
34. Antony Franklin; Minimization of HD Maps data transmission through edge caching and spatial aware update transmission; 2417.7; [NMICPS TIHAN/CSE/F157/2022-23/S235].
35. Antony Franklin; Enabling Multi-Hop in C-V2X Network; 28024; [SUZUKI/CSE/F157/2022-23/S267].

Awards & Recognitions:

1. C Krishna Mohan has received Fulbright-Nehru Fellowship Award 2023.
2. C Krishna Mohan has been selected as co-opted members of the SERB-PAC committee in Biomedical and Health Science(BHS).
3. Jyothi Vedurada has been inducted as the Program Committee Member: ACM PPOPP 2023, VSTTE 2022, ISEC 2022.
4. Jyothi Vedurada has been inducted as the Program Vice-Chair: IEEE HiPC 2022.
5. Anish Hirwe (PhD 2020), who worked under the guidance of Kotaro Kataoka, has been appointed as an Assistant Professor at Department of Computer Science & Engineering IIT Palakkad.
6. Praveen Aravind Babu Tammana has received the IBM Academic Award under Global University Program (GUP).
7. Rajesh Kedia has been Elevated to Senior Member of IEEE in November 2022.
8. Rakesh Venkat has received the Teaching Excellence Award (2023) - (Professional Service): Served on Program Committee of FSTTCS 2022 (International Conference).
9. Srijith P K received Sony research award.
10. Subrahmanyam Kalyanasundaram has been elected as Senior Member of IEEE (April 2023).
11. Arghya Pal (PhD 2020), who worked under the guidance of Vineeth N Balasubramanian, received a tenure-track Assistant Professorship offer from Monash University (Australia Campus).
12. Vineeth N Balasubramanian, Fulbright-Nehru Academic and Professional Excellence Fellowship, 2022-23.
13. Vineeth N Balasubramanian, Best Paper Award Honorable Mention, Continual Learning in Computer Vision (CLVISION) workshop, CVPR 2022 (CORE A-ranked conference).
14. Vineeth N Balasubramanian, NASSCOM AI Gamechangers Award (DL Algorithms and Architecture category), Winner and Runner-up, 2022.
15. Vineeth N Balasubramanian, Microsoft Academic Partnership Grant Award, 2022.
16. Antony Franklin, Best paper award in COMSNETS 2022 Conference for the paper "NUMASFP: NUMA-aware Dynamic Service Function Chain Placement in Multi-core Servers" jointly with Venkatarami Reddy Chintapalli, Sai Balaram Korrapati, Bheemarjuna Reddy Tamma.

Research Highlights

1. **Meta-XNLG: A Meta-Learning Approach Based on Language Clustering for Zero-Shot Cross-Lingual Transfer and Generation – Dr Maunendra Sankar Desarkar:**



Architecture and functioning of the Meta-XNLG model

Telugu-XLSum	<p>Input Document: ప్రయత్నంలో అధిష్ట విలీనం సహా తమ డిమాండ్లన్నింటినీ సాధించే వరకూ తోరాలుం అవలీమని కార్మికులు ప్రకటించారు. అధిష్ట కార్మిక సంఘాల జెపీసీ అధ్యక్షులలో ఈ సభ జరిగింది. కార్మికులకు మధ్యతూ పలు రాజకీయ పార్టీల నాయకులు దీనికి హాజరయ్యారు. సభ జరిగిన సందర్భనలో ఐదేళ్ల ప్లేడియం కార్మికులతో నిండిపోయింది. కాంగ్రెస్ నాయకుడు రేవంత్ రెడ్డి, జీజెపీసీ అధ్యక్షుడు కొండారాం, జీజెపీసీ తెలంగాణ అధ్యక్షుడు ఎల్ రమణ, నీలవ నాయకుడు దాద వెంకటే రెడ్డి, వీజెపీ నేత ఎవెక్, ఎంఆర్పీఎస్ నాయకుడు మంద కృష్ణమూర్తిగోపాల్ పలు ప్రజా సంఘాలు, రాజకీయ పార్టీల నాయకులు, కళాకారులు, కార్మిక సంఘాల ప్రతినిధులు ఈ సభకు హాజరయ్యారు. సభలో మోడ్రాడిన్ వారంజా ప్రయత్న వైఖరిని తప్పిస్తూ, కార్మికులకు అందగా ఉంటామని ప్రకటించారు. అధిష్ట విలీనం చేయడం ఎందుకు సార్వం కాదో తెలిపారు. రేవంత్ రెడ్డి ప్రయత్నాన్ని డిమాండ్ చేశారు. తెలంగాణ సీఎం కేసీఆర్ తీసుకునే నిర్ణయాలు అన్ని మేని పుల్లో పెట్టే తీసుకుంటున్నారా అని ప్రశ్నించారు. కార్మికులకు మధ్యతూ అందోకనలు చేస్తామని, అమెరికాలో మిలియన్ మార్చ్ నిర్వహిస్తామని కొండారాం హెచ్చరించారు. "కేసీఆర్ ఎన్నో పుస్తకాలు చదివానని చెప్పుకుంటారు. కానీ, అయినా కూడా అసహనం కుడా అవగాహన లేదు" అని దాద వెంకటరెడ్డి విమర్శించారు. ఈ సమయంలో కేంద్రం జోక్యం చేసుకోవాలని అయిన కోరారు. కార్మికుల చక్కతను దెబ్బతీయడానికి కేసీఆర్ కుట్రలు ఎన్ను తున్నారని, కార్మికులు అప్రమత్తంగా ఉండాలని ఎల్ రమణ విధిస్తే చేశారు. అధిష్ట అసాధ్యం అంటే చేయాలని ప్రయత్నం ప్రయత్నాలు చేస్తోందని అభిప్రాయించారు. కేసీఆర్ అవగాహన అని, తప్పకుండా ప్రధానాలు చేస్తున్నారని వీజెపీ నేత ఎవెక్ అన్నారు. నీలవ జన ప్రేర సభకు హైదరాబాద్లో పాటు ఇతర ప్రాంతాలకు చెందిన అధిష్ట సమితిని తరలి వచ్చారు. సభలో కేసీఆర్ కు వ్యతిరేకంగా నిరాయలు దాద సార్వ వినిపించారు. సభా ప్రాంగణం సరిహద్దులో జయకు కుడా పుల్లె సంఖ్యలో కార్మికులు నిలబడిపోయారు. అధిష్ట కార్మికులతో పాటు వాసుపల్లెల కార్మికులు కూడా సభకు పుల్లె సంఖ్యలో హాజరయ్యారు. అధిష్ట సమితి బుద్ధివంతంగానే 26 రోజులకు చేరుకుంది. ప్రస్తుతానికి సమితి ముగిసే సంగతాలు ఏమీ కనిపించడం లేదు ప్రయత్నం, కార్మిక సంఘాలు తమ తమ వారసలకు కట్టబడి ఉన్నాయి. అధిష్ట ముఖ్యమంత్రి కేసీఆర్ బుద్ధివంతం సమితి నిర్వహించారు. మరోవైపు, గురువారం అన్ని డిమాండ్ ముందు నిరాహార దీక్షలు చేయాలని అధిష్ట జెపీసీ పిలుపునిచ్చింది. ఇవి కూడా పదవండ్ల (వీజెపీ తెలుగును పేనుబుక్, ఇన్స్ట్రామెంట్, జీజెపీలో పాల్ అవ్వండి. యూట్యూబ్లో సబ్ స్క్రిప్ట్ చేయండి.)</p> <p>Human: సమితి వారు పట్టిన తెలంగాణ అధిష్ట కార్మికులు బుద్ధివంతం హైదరాబాద్ లో సకల జనప్రేర పేరుతో సభ నిర్వహించారు.</p> <p>Meta-XNLG: తెలంగాణ అధిష్ట కార్మిక సంఘాల జెపీసీ అధ్యక్షులలో జరిగిన సకల జన ప్రేర సభ హైదరాబాద్ లో జరిగింది.</p>
Bengali-XLSum	<p>Input Document: ভারতের অন্য অঞ্চলগুলি থেকে পেশাদারি নিষিদ্ধ করার মানি জানাচ্ছেন কবীর। স্থানীয় পণ্যের ব্যবহার নিষিদ্ধ করার জন্য এই উদ্যোগ গ্রহণ করেছে ব্যবসায়ীরা। রাজ্যের শীর্ষ দুটি ব্যবসায়ী এসোসিয়েশন এই দুটি পেশাদারি নিষিদ্ধ করার প্রস্তাব করেছিল। অর্থাৎ প্রেসকপটে আজ কৃষকের থেকে অমিলনাতু রাজ্যে নিষিদ্ধ হলে কেবলা-কেলা ও পেশাদারি। প্রতিষ্ঠানগুলো হলো, কোমলা পানীয়ের প্রতিষ্ঠানগুলো নীল থেকে প্রচুর পানি ব্যবহার করে, সেজন্যে কৃষকদের জমি সেচের সমস্যা ব্যাপক হোগাফিত্তে পড়বে হয়। বিশেষ করে বঙ্গের সমস্ত সেচ পানি সমস্যা প্রকট হয়ে উঠবে। রাজ্যের দশ লাখেরও বেশি যেকোনো এ নিষেধাজ্ঞা যেনে চলবে বলে আশঙ্কা করা হচ্ছে। গত মাসে অমিলনাতুতে ভারতিকাণ্ট নামে ঐতিহাসিকী খেঁড়ের লাঠাই নিষিদ্ধের বিরুদ্ধে ব্যাপক বিক্ষোভের ঘটনা বেবে রাজ্যে পেশাদারি, কোমলা কোমলা নিষিদ্ধের প্রস্তাব করে শীর্ষ দুটি ব্যবসায়ী সংগঠন ফেডারেশন অব অমিলনাতু ট্রেডার্স এসোসিয়েশন (এফটিএনটিএ) এবং অমিলনাতু ট্রেডার্স এসোসিয়েশন। বিক্ষোভের সমস্যা আন্দোলক কলিহিলে অমিলনাতু নিষিদ্ধ করা যেনে স্থানীয় ঐতিহ্য ও সাংস্কৃতিক অর্থমাননা করা। আশঙ্কা করেক মাস আগে কোমলা পানীয়ের বিরুদ্ধে আন্দোলের প্রচারণা শুরু করি, কিন্তু এখন আমরা ভারতিকাণ্ট নিষিদ্ধের প্রতিবাদে বিক্ষোভ শুরু করি, কোমলা পানীয়ের বিরুদ্ধে আন্দোলের প্রচারণাও শুরু পায়।- বিবিসি অমিল অফিসিয়াল থেকে এক সাক্ষাৎকারে কলিহিলে অমিলনাতু ট্রেডার্স এসোসিয়েশনের প্রেসিডেন্ট বা ফেলোয়ান। © পেশাদারি</p> <p>Human: ভারতের বাসিন্দাদের রাজ্যে অমিলনাতু ব্যবসায়ীরা সেখানে কেবলা-কেলা ও পেশাদারি নিষিদ্ধ ঘোষণা করেছে।</p> <p>Meta-XNLG: ভারতের অমিলনাতু রাজ্যে কোমলা পানীয় নিষিদ্ধ করার মানি জানিয়েছে ব্যবসায়ীরা।</p>
Hindi-Wikilingua	<p>Input Document: ठंडे पानी से थोटे हुए दाग को कुछ हलका करने की कोशिश की। ठंडे पानी और एक टौवल को मदद से धब्बे को पीछा कर लें। या फिर, दाग को ठंडे पानी के नीचे भी लगाया जा सकता है। पेंट बनाने के लिए एक भला ठंडा पानी और दो भला नमक को मिलाएं। अपनी कितने नमक और पानी की जरूरत पढ़ने वाली है, ये थोड़ी तरह से उस धब्बे के आकार पर निर्भर करेगा। नमक के साथ में बहुत ज्यादा पानी भी न मिलाएं, नहीं तो वे ठिकठ बन जाएंगे। पेंट फैलाने साफक लदा होना चाहिए। आप पाई तो पेंट को दाग पर लगाने के लिए अपने हाथ का या एक साफ कपड़े का पूरा भी कर सकते हैं। पेंट को बहुत अराम से धब्बे के ऊपर रगड़ लें। अब अपनी वो दाग हलका होना हुआ नजर आना चाहिए। जैसे ही, ज्यादातर या पूरा धब्बा निकल आए, कपड़े को ठंडे पानी के नीचे लगा दें। पेंट के पूरे साफ होने तक इसे धोते रहें। अगर दाग अभी तक पूरा नहीं निकल पाया है, तो पेंट को फिर से लगा दें। उस कपड़े को धोने के लिए भी ठंडी साफन का पूरा करें, जिसे आप नॉर्मली पूरा किया करते हैं। हालाँकि, कपड़े को धोने के लिए ठंडे पानी के अलावा और किसी चीज़ का पूरा बिल्कुल न करें। कपड़े को धोने के बाद, इसे हवा में सुखाने के लिए लटका दें।</p> <p>Human: दाग को ठंडे पानी से धो लें, नमक और पानी से एक पेंट तैयार करना: पेंट को धब्बे पर लगा लें, कपड़े को ठंडे पानी में धो लें, नॉर्मल जैसे ही धो लें।</p> <p>Meta-XNLG: धब्बे को ठंडे पानी से धोने के लिए एक टौवल का पूरा कर लें। नमक और पानी का घोल बनायें। धब्बे को पीछा से धोयें, ठंडे पानी से धोयें।</p>

Sample generation from the Meta-XNLG model for the zero-shot languages (model did not see task-specific training data for these languages)

In this paper, we propose a novel meta-learning framework (called Meta-XNLG) to learn shareable structures from typologically diverse languages and use it for cross-lingual transfer of learning for Natural Language Generation (NLG) tasks. In this setup,

- We automatically group the available languages into multiple clusters based on their typological structures.
- Then, we train a common model for NLG tasks using supervised examples from only the centroid languages in the clusters.
- The learned model is then directly applied to the other languages from the same cluster for the tasks without the requirement of any task-specific training data for these languages. These languages can also be termed as zero-shot languages (as the model saw zero/no task-specific training data from these languages).

Thereby, one single model caters to all the languages under consideration and utilizes the task-specific training data from only the centroid languages. Some examples of generations from this model for the zero-shot languages are shown for reference. This work can be used for text generation in languages for which not much training data is available and can be very helpful for multilingual countries like India.

Paper: Kaushal Kumar Maurya, Maunendra Sankar Desarkar, Meta-XNLG, A Meta-Learning Approach Based on Language Clustering for Zero-Shot Cross-Lingual Transfer and Generation. ACL (Findings) 2022:269-284.

2. Hostility Detection in Online Hindi-English Code-Mixed Conversations – Dr Maunendra Sankar Desarkar:



Hostility Detection in Online Hindi-English Code-Mixed Conversations

The social media is seeing a huge increase in hateful and offensive comments. Comments spreading or provoking hatred are unwanted. Moreover, the comments/posts that directly do not contain anything hateful but support hateful comments/posts are equally unwanted. This work proposes a technique to detect such unwanted comments (original, derivatives, supportive) in social channels – through context identification and weighted context augmentation for the task.

Paper: Aditi Bagora, Kamal Shrestha, Kaushal Maurya, Maunendra Sankar Desarkar, Hostility Detection in Online Hindi-English Code-Mixed Conversations. ACM Web Science 2022: 390-400.

3. Towards Fair Evaluation of Dialogue State Tracking by Flexible Incorporation of Turn-level Performances - Dr Maunendra Sankar Desarkar:

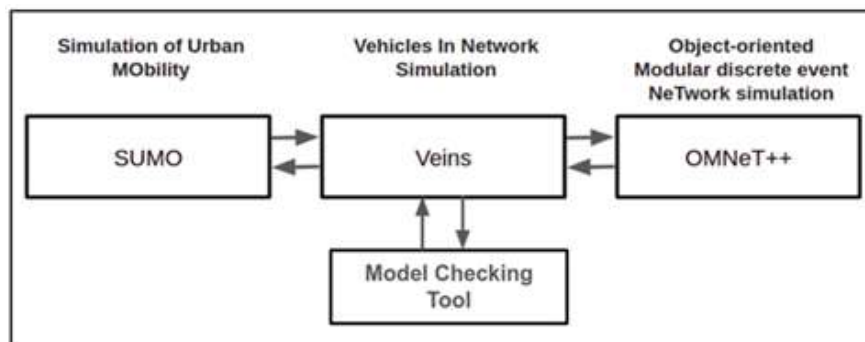
Dialog State Tracking is an important subtask for any goal-oriented dialog system or conversational AI system. At any stage of a dialog, its Dialog State is a collection of belief states or slot-value pairs that are live and under discussion at that point. Dialog Systems are often evaluated using Joint Goal Accuracy (JGA), which requires an exact match of the computed dialog state with the ground truth dialog state. However, as the dialog state is cumulative in nature, one error in slot-value prediction at the beginning of the dialog often falls through and hurts the performance of the model, although the model might have performed well in the subsequent turns. This metric is thus very strict and often underestimates the performance of DST models. We propose a new metric, Flexible Goal Accuracy (FGA) that partially penalizes a misprediction that is locally correct, i.e. the source of the misprediction is some earlier turn. The penalty can be adjusted using a hyperparameter, thereby allowing further flexibility to determine the penalty based on the requirement of the domain under consideration (e.g. medical vs. tourism vs. e-commerce, etc.).

Turn	Conversation Details		Exact match	Turn match
0	U_0	Hi, I am traveling to Cambridge and could use some help for sure. I am so excited to see some local tourist attractions.	✓	✓
	B_0	{ }		
	B'_0	{ }		
1	S_1	We have 79 attractions to choose from, anything specific that you would like to tell us to help narrow it down?	✓	✓
	U_1	I'm looking for a hotel called cityroomz.		
	B_1	{hotel: {name: cityroomz}}		
	B'_1	{hotel: {name: cityroomz}}		
2	S_2	Cityroomz is a 0-star hotel in the center of town. Its address is Sleeperz Hotel, Station Road.	✗	✗
	U_2	Can you please book a room for 4 people for 2 nights starting on wednesday?		
	B_2	{hotel: {area: centre, day: wednesday, people: 4, stay: 2, name: cityroomz, stars: 0}}		
	B'_2	{hotel: {day: wednesday, people: 4, stay: 2, name: cityroomz}}		
3	S_3	Booking was successful. Reference number is : WGUYAGN2 anything else i can help?	✗	✓
	U_3	Thanks. I am also looking for places to go in town. Perhaps an attraction in the city centre.		
	B_3	{attraction: {area: centre}, hotel: {area: centre, day: wednesday, people: 4, stay: 2, name: cityroomz, stars: 0}}		
	B'_3	{attraction: {area: centre}, hotel: {day: wednesday, people: 4, stay: 2, name: cityroomz}}		

Failure in Exact Match in spite of turn level match, due to errors made in the past

Paper: Suvodip Dey, Ramamohan Kummara, Maunendra Sankar Desarkar, Towards Fair Evaluation of Dialogue State Tracking by Flexible Incorporation of Turn-level Performances. ACL (2) 2022: 318-324

4. Traffic Intersections as Agents: A model checking approach for analysing communicating agents – Dr Subrahmanyam Kalyanasundaram and Prof M V Panduranga Rao:



Traffic Intersections as Agents: A model checking approach for analysing communicating agents

The analysis of traffic policies, for instance, the duration of green and red phases at intersections, can be quite challenging. While the introduction of communication systems can potentially lead to better solutions, it is important to analyse and formulate policies in the presence of potential communication failures and delays. Given the stochastic nature of traffic, posing the problem as a model-checking problem in probabilistic epistemic temporal logic seems promising. In this work, we propose an approach that uses epistemic modalities to model the effect of communication between multiple intersections and temporal modalities to model the progression of traffic volumes over time. We validate our approach in a non-stochastic setting using the tool Model Checker for Multi-Agent Systems (MCMAS). We develop a Statistical Model Checking module and use it in conjunction with a toolchain that integrates a traffic simulator (SUMO) and a network simulator (OMNeT++/Veins) to study the impact of communications on traffic policies.

Paper: "Traffic Intersections as Agents, A model checking approach for analysing communicating agents." B. Thamilselvam, Y. Ramesh, S. Kalyanasundaram, and M. V. Panduranga Rao.

Proceedings of the 38th ACM/SIGAPP Symposium On Applied Computing (SAC 2023), Tallinn, Estonia, March 2023.

Department of Design

The Department of Design offers a vibrant environment for learning, practicing, researching, and exploring several facets of design. The department envisions creatively engaging in the space between technologies and people. This involves facilitating innovation in key emergent areas such as Participatory and collaborative Design, Communication and interaction Design, Professional Ethics and sustainability, Product Systems and services, Design and Education, Wellness, Crowd Sourced Design, etc. “Design” calls for thinking “from scratch,” thinking “Out of the box,” and thinking in line with the needs of contemporary society and devising creative solutions. “Design” is essentially aimed at enhancing the user experience. Improvement of any process/service/equipment by incorporation of ingenious means is what defines “Good Design.” The Department of Design is committed to the growth of design education. To fulfill this vision, a joint PhD program with Swinburne University, Australia, and a Design Minor program has been initiated.

The design department admitted the third Batch of Bachelor of Design (BDes) and the ninth Batch of Master of Design (MDes) students this year. Dr Saurav Khuttiya Deori joined the department as an Assistant Professor, which makes the total number of regular faculty in the department 10. The department also completed two cohorts of certificate programs on “Visual design and user experience” through the Centre for Continuing Education (CCE) and in collaboration with TalentSprint.

The faculty have published their research and academic works in internationally recognized conferences, journals, design competitions, and workshops. The members of the department also participated in large numbers in the “International Conference on Research into Design (ICoRD 23)” Held in IISc Bangalore, which is one of the premiere design research conferences. One of the papers authored by our faculty and students, Dr Shiva Ji and Avinash PK, also received the “Best Paper” Award. We will also be hosting this conference in January 2025.

The department also organized talks, seminars, and guest lectures from eminent academicians, researchers, innovators, and authors. Some of the important talks include “Industry 4.0, Overview and Examples from a Smart Factory” by Prof Amaresh Chakrabarti, Chairman and Professor, CPDM, IISc Bangalore, “The Biennale Model” by Bose Krishnamachari, and “The free software movement and GNU,” an Extra Mural Lecture by Richard Stallman. The department also collaborated with the Suzuki Innovation Centre on campus to organize a talk from the grass-root innovator Mr Naik Qayoom from Srinagar, Kashmir.

For more information, please visit: <https://design.iith.ac.in/>

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Internal Adjunct Faculty

Patents:

Registered Applications:

1. Akansha Singh, B Vivekananda Chary, P Neelakantan Keshavan. (2022). Spindle Based Seating Furniture.

Books:

1. Ankita Roy; A Tribute to Bundela Painting. ISBN: 978-8193208564.

Publications:

1. Rao M N, & Mathew D J. (2022). Design Briefs: Review, Reframing Briefs, and Analysis of a Study. International Journal of Design Education, 17(1). <https://doi.org/10.18848/2325-128X/CGP/v17i01/1-20>.
2. Bhandari Upasana, & Mathew Deepak John. (2022). Implementing 21st Century Pedagogical Requirements in a Lesson Plan Design and Development of a Lesson Plan for fifth grade in an Indian School. <https://doi.org/10.1145/3502434.3502457>.
3. Rautray P, Mathew D J, Eisenbart B, & Kuys J. (2022). Understanding Working Scenarios of Urban Air Mobility. Proceedings of the Design Society, 2(undefined). <https://doi.org/10.1017/pds.2022.58>.
4. Solanki C & Mathew Deepak John. (2022). Factors Affecting Engagement in Digital Educational Games India HCI 2021. <https://doi.org/10.1145/3506469.3506491>.
5. Solanki Chaitanya & Mathew Deepak John. (2022). An exploratory study using the first-person role-playing game 'Tattva Bhoomi' to improve learning in middle school children: A quasi-experimental study. Innovations Journal. <https://journal-innovations.com/assets/uploads/doc/6a645-238-244.16111.pdf>.
6. Bhandari U & Mathew D J. (2022). A Critical Review of National Education Policy 2020: Role of Twenty-First-Century Skills and Scope of Design Education in Indian Schools. International Journal of Design Education, 17(1). <https://doi.org/10.18848/2325-128X/CGP/v17i01/21-35>.
7. Remedios D J, Mathew D J, & Schleser M. (2022). Rotating Cylindrical PIN VR Display—An Ergonomic Approach for VR Scripts. Lecture Notes in Networks and Systems, 391(undefined). https://doi.org/10.1007/978-3-030-94277-9_27.
8. Saha Indranil & Mathew D J. (2022). Digital innovation in the fashion industry: a review and prospects with a special focus on the 3D printing technology. Metszet Journal (Volume 7, Issue 11, November-2022). <https://doi.org/10.27896/METSZET7.11/32>.
9. Bhandari Upasana & Mathew Deepak John. (2022). A Critical Review of National Education Policy 2020: Role of 21st Century Skills and Scope of Design Education in Indian Schools. International Journal of Design Education. <https://doi.org/10.18848/2325-128X/CGP/v17i01/21-35>.
10. Rangarajan V, Onkar P S, De Kruiff A, & Barron D. (2022). A descriptive phenomenological approach to perception of affective quality in design inspiration. Design Studies, 78(undefined). <https://doi.org/10.1016/j.destud.2021.101072>.
11. Raju S K K & Onkar P S. (2022). Lattice_Karak: Lattice structure generator for tissue engineering, lightweight and heat exchanger applications [Formula presented]. Software Impacts, 14(undefined). <https://doi.org/10.1016/j.simpa.2022.100425>.
12. Rangarajan V, Onkar P S, De Kruiff A, & Barron D. (2022). The role of perception of affective quality in graphic design inspiration. Design Journal, 25(5). <https://doi.org/10.1080/14606925.2022.2082126>.
13. Pawar T, Sharma A, & Ji S. (2022). Heritage Representation of Kashi Vishweshwar Temple at Kalabgoor, Telangana with Augmented Reality Application Using Photogrammetry. Lecture Notes in Electrical Engineering, 924(undefined). <https://doi.org/10.1007/978-981-19-4136-83>.
14. Chakraborty S & Ji S. (2022). A Sustainable Approach for the Urban Sprawl of Kolkata (Circa 1690-2020). Lecture Notes in Networks and Systems, 391(undefined). https://doi.org/10.1007/978-3-030-94277-9_100.
15. Chakraborty S, & Ji S. (2022). Evolution of Bagbazar Street Through Visibility Graph Analysis (1746-2020). Lecture Notes in Electrical Engineering, 924(undefined). https://doi.org/10.1007/978-981-19-4136-8_5.
16. Chakraborty S, & Ji S (2022), A Sustainable Approach for the Urban Sprawl of Kolkata (Circa 1690-2020). Lecture Notes in Networks and Systems, 391(undefined) https://doi.org/10.1007/978-3-030-94277-9_100.
17. Pawar T, Sharma A, & Ji S (2022), Heritage Representation of Kashi Vishweshwar Temple at Kalabgoor, Telangana with Augmented Reality Application Using Photogrammetry. Lecture Notes in Electrical Engineering, 924(undefined) https://doi.org/10.1007/978-981-19-4136-8_3.

Funded Research Projects:

1. Deepak John Mathew; Integrating AI, AR and VR in learning models and their impact; 21.1 L. [DSIR/DES/F132/2021-22/G452].
2. Mohammad Shahid; Cheriya Craft; 11.67 L. [IGNCA/DES/F240/2023-24/S269].
3. Saurav Khuttiya Deori; A study on early Architectural ornamentation in the context of Assam to develop a visual framework; 30 L. [SG/IITH/F319/2022-23/SG-147].
4. Shiva Ji; Creating Digital Immersive Heritage Experience, Risk Assessment and Vernacular Architecture Analysis of Five Historically Significant Temple Marvels of Kashi; 89 L. [DST/SHRI/DES/F205/2022-23/G483].
5. Srikar A V R; Fully Standalone Types Photovoltaic fed Zero carbon battery charging station for institute's EVs (without grid connectivity); 29.52 L. [IITH/DES/F257/2022-23/G470].
6. Srikar A V R; Redefining User Experience of Smart Glasses for the Visually Impaired through Generative Design; 2 L. [DRISHTI CPS/CF/SL/PG/2023/000002].
7. Shiva Ji; Creating Digital Immersive Heritage Experience ,Risk Assessment and Vernacular Architecture Analysis of Five Historically Significant Temple Marvels of Kashi; 89.5; [DST/SHRI/DES/F205/2022-23/G483].
5. Save Our Species, an Independent Stop-motion animation film directed by Delwyn Jude Remedios, has been
 - The Official Selection at Changing Climate Changing Lives Film Festival, Thailand 2022
 - The Official Selection at Happy Valley Animation Festival, United States 2022
 - The Official Selection at Toxics Link, Delhi 2022
 - The Official Selection at Reto por el Mundo / Erronka Munduan / Challenge for the World, Spain 2023
6. VR the World, a digital 2-D film directed by Pravin J, under the guidance of Delwyn Jude Remedios has been
 - The Semi Finalist at International Cultural Artifact Film Festival (ICA) - 2022
 - Semi Finalist at International Cultural Artifact Film Festival (ICA) - 2022
7. Cheppalanivundi, a digital 3-D film directed by Pulugam Sai Kumar, under the guidance of Delwyn Jude Remedios has been
 - The Official Selection at ONE EARTH film festival 2022
 - The Official Selection at the Student World Impact Film Festival 2022
 - The Official Selection at First-Time Filmmaker Sessions 2022
8. Neelakantan P K and his student Akansha were the First runner up at ADI Battle of Projects, for their project "Spindle".
9. Shiva Ji won the Best Paper Award for the paper "Climate change impacts on the built heritage of Hyderabad" at the International Conference on Research into Design 2023 organized by the Indian Institute of Science Bangalore.

Awards & Recognitions:

1. Ankita Roy received the National Tourism Award for the Book – "The Magic of Mandu – Suhur-e-Shaadiabad" for "Excellence in Publishing in English" by Ministry of Tourism, GoI, Incredible India – Given by Vice President of India Shri Jagadeep Dhankhar and Shri G Kishan Reddy (Minister of Tourism & Culture).
2. Ankita Roy received the TYPODAY 2022 Best Poster Design Award at Typo Day 2022.
3. Ankita Roy received the Prestigious National award for excellence in Publishing.
4. Mitti, an independent Sand Animation Film directed by Delwyn Jude Remedios, has been
 - The Runner Up at Cineaste International Film Festival of India, Delhi 2022,
 - The Finalist at 60 Seconds Short Film Fest, United States, 2023
 - The Official Selection at TAAFI - Toronto Animation Arts Festival International, 2023
 - The Official Selection at Lift-Off Filmmaker Sessions @ Oinewood Studios, United Kingdom 2022.
10. Shiva Ji won the Best Paper Award for the paper "The transition of food grain purchasing systems in urban gated communities towards a circular economy in India" at the International Conference on Research into Design 2023 organized by the Indian Institute of Science Bangalore, 09-11 Jan 2023.

Highlights

1. Representation of Gond Art in the form of Type design by Harsh Raj Gond (M.Des 21-23), working under the guidance of Mohammad Shahid.

Harsh Raj Gond (M.Des 21-23) is one among the winners of the Typoday 2022, organized by IDC, IIT Bombay. The Poster is a representation of Gond Art in the form of Type design.



2. Cheriya Craft Project in collaboration with Indira Gandhi National Centre for Arts (IGNCA) & Aatmanirbhar Bharat Centre for Design (ABCD), New Delhi by Dr Mohammad, Shahid Nandini Louganee & Pragna, MDes.



3. Vāyu and Cāru developed by Shovan Kanti Kar and V Vishnu Srinivasa Prasad respectively (MDes 2021-23) under the guidance of Prof Srikar AVR.



Department of Electrical Engineering

Welcome to the Electrical Engineering Department Annual Report for the year 2022-2023. This report provides a comprehensive overview of the department's achievements, activities, and advancements during the past year. Our commitment to excellence in electrical engineering education and research remains unwavering, and we are proud to present the highlights of our journey in 2022-2023.

The Electrical Engineering Department has been a cornerstone of engineering education since its establishment. We offer a comprehensive range of undergraduate and graduate programs in Electrical Engineering, specializing in areas such as Microelectronics VLSI, Power Electronics and Power Systems, Systems and Control, Communications, Signal Processing and Learning. Our department fosters an innovative and collaborative learning environment to nurture the next generation of electrical engineers.

This year, the EE department reached 560 students (BTech + MTech + PhD). Our department is home to 33 dedicated faculty members, each possessing a strong academic background and expertise in diverse electrical engineering domains, and 13 support staff, who play a crucial role in maintaining a conducive learning environment for our students. We strive to foster innovation, critical thinking and a collaborative spirit among our students. This leads to the highest average citation (0.7) in the past three years and the second (2.72) (after IIT Bombay, 2.95) in the last ten-year published paper in the electrical engineering department across all the IITs. Dr. Arthi Gopalakrishnan, an alumna of IIT Hyderabad who worked under Dr. Sushmee Badhulika, received the best thesis award in the area of carbon nanomaterials" from the INYAS-INSA committee on National Science Day (28th February 2022). Lakshmi Prasad Natarajan (EE) has been selected for the INSA (Indian National Science Academy) Young Scientist Award. This is one of the best recognitions for a young researcher in India.

Project Funding

The department secured significant funding from various sources to support research initiatives, develop advanced technologies, and foster academic growth. The support and funding around 9133.15924 lakhs received through various private/public agencies have been instrumental in advancing the research and educational endeavours of the Electrical Engineering department during 2022-2023. These financial resources have enabled the department to make significant strides in cutting-edge research and innovation, enriching the learning experience of our students and strengthening our impact in the field of electrical engineering.

Placement

This year, the department achieved an outstanding placement record (B.tech: 90.20%, M.tech: 97.14%, PhD: 100%). The high placement rate achieved by our Electrical Engineering students showcases the department's dedication to nurturing skilled and industry-ready professionals. We are proud of our students' accomplishments and express gratitude to the faculty, staff, and industry partners for their support in making these achievements possible. We remain committed to empowering our students with the knowledge and skills needed to excel in their chosen careers and contribute significantly to the field of Electrical.

[For more information, please visit: https://ee.iith.ac.in/](https://ee.iith.ac.in/)



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Patents:

Filed:

1. Abhinav Kumar; A method for adaptive multi-user clustering in Non-Orthogonal Multiple Access systems with IMPerfect; 202241018280.
2. Abhinav Kumar, Sundaram vanka; Configurable Wireless Networks; 202241035398.
3. Kiran Kumar Kuchi; Methods for Signaling Channel State Information Feedback between User Equipment and Base Station; 202241023541.
4. Kiran Kumar Kuchi; A Spatially Separable Attention Mechanism for Massive MIMO CSI Feedback; 202241044961.
5. Kiran Kumar Kuchi; Methods of signaling channel state information feedback with varying feedback dimensions; 202241060837.
6. Shiv Govind Singh; Thermally Evaporated Organic Photovoltaic Cell and a Method of Fabrication Therefor; 202241060162.
7. Sumohana S Channappayya; Multi-Spectral System Design for Robust Detection and Tracking of Objects; 202241050692.

Published:

1. Kiran Kumar Kuchi; Method and system for generating a transmit waveform for reference sequences; US 17/284,050.
Kiran Kumar Kuchi; Method and system for generating a waveform in a communication network; US 17/601785.
Shishir Kumar; Miniaturized Microscope Device and Method Thereof; 202041030727.
Shiv Govind Singh; Thermally Evaporated Organic Photovoltaic Cell and a Method of Fabrication Therefor; 202241060162.
5. Shiv Govind Singh; Chemi resistive bio sensor for quantitative detection of retinopathy of prematurity associated biomarks and the process thereof; 202241039688.
6. Shiv Govind Singh; Metallic transition metal dichalcogenide based chemiresistive bio sensor; 202241026382.
7. Rajalakshmi P; Techniques for real time aquarate geo referencing objects using lidar; 202141020099.
8. Rajalakshmi P; A system for determination of flight performance of bioinspired aerial vehicle in simulated space conditions; 202241043483.
9. Rajalakshmi P; Energy efficient biomimetic Nano Aerial Vehicle and method for generating energy; 202141057570.
10. Rajalakshmi P; Techniques for Improved Maneuverability of Bioinspired Quad Wing Unmanned Aerial Vehicle; 202141017174.
11. Zafar Ali Khan Mohammed; A Universal Generalized Flip Decoder and a Method of Decoding Thereof; 202241074335.
12. Shishir Kumar; MINIATURIZED MICROSCOPE DEVICE AND METHOD THEREOF.; 202041030727.

Granted:

1. Kiran Kumar Kuchi; Method and system for designing a waveform for data communication; 201747032497.
2. Kiran Kumar Kuchi; Method for estimating channel states of plurality of user equipments (ues); 201641025741.
3. Kiran Kumar Kuchi; Methods and transmitters for pre-coding a waveform with low peak-to-average- power; 201641013222.
4. Kiran Kumar Kuchi; Method and apparatus for reducing phase discontinuities in a tone phase shift keying; 201641005999.
5. Kiran Kumar Kuchi; Method and system for transmitting and receiving a waveform with low paper; 201641000865.
6. Kiran Kumar Kuchi; Method and system for pilot transmission with low peak to average power ratio (papr); 3316/CHE/2015.
7. Sushmee Badhulika; ZnSnO₃/In₂O₃ Core-Shell Nanofibers, Method of Preparing them and Their Uses; 202141056630.

Publications:

1. Bhangé P, Joshi D K, Pandu S K, Mankari K, Acharyya S G, Sridhar K, & Acharyya A. (2022). Real-Time Fatigue Crack Growth Rate Estimation Methodology for Structural Health Monitoring of Ships. IEEE Sensors Journal, 22(20). <https://doi.org/10.1109/ISEN.2022.3204146>.
2. Vatti C S, Rakesh M B, Ravi Teja Reddy P, & Acharyya A. (2022). A Hierarchical Fault-Tolerant and Cost Effective Framework for RRAM Based Neural Computing Systems. IEEE Transactions on Circuits and Systems II: Express Briefs, 69(3). <https://doi.org/10.1109/TCSII.2022.3144193>.
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Funded Research Projects:

1. Aditya T Siripuram; Development of Real-time audio and speech processing modules for robot audition; 230.4 L. [RCI DRDO/EE/F001/2022-23/S232].
2. Amit Acharyya; Power Optimization of Auxiliary Systems SO no: sezu-2-20220714-054 Dt:14.07.2022 (Payment milestone:35% after releasing SO); 13.8 L. [MOBIS/EE/F091/2022-23/S234].
3. Amit Acharyya; Collaboration Service for Machine Learning based Models; 27.6 L. [S211].
4. Amit Acharyya; Spintronics-based Digital logic Architecture Design for AI Applications; 60 L. [SERB/EE/F091/2022-23/G546].
5. Emani Naresh Kumar; Assistive Software for auditing the security of quantum communication equipment; 14.73 L. [QSIPL/CSE//F010/2022-23/S260].
6. Emani Naresh Kumar; Engineering Light Emission in Nanophotonic Structures Using Two-Pulse Excitation; 51.7 L. [SERB/EE/F195/2022-23/G534].
7. G V V Sharma; 5G-Adv ORAN Massive MIMO Base Station; 7499 L. [IITB-COMET/EE/F072/2022-23/G473].
8. Jose Titus; Six-phase induction motor drives with extended speed range using silicon carbide based current source inverter and silicon IGBT based voltage source inverter for electric traction applications; 32.98 L. [SERB/EE/F283/2022-23/G506].
9. Mohammed Zafar Ali Khan; IIT-H-Terragraph-60 GHz Trial; 0.49 L. [FCL/EE/F013/2022-23/S244].
10. Oves Mohamed Hussein Badami; Development of simulation framework and modeling of bipolar valence change RRAM:Focus on the electron transport and ambient temperature; 28.96 L. [DST-SERB/EE/F241/2022-23/G498].
11. Rupesh Ganpatrao Wandhare; Design of power converter for 3-phase grid integration of Hydrogen fed PEM Fuel cell using high frequency link multistage converter; 51.69 L. [G433].
12. Rupesh Ganpatrao Wandhare; Hybrid Bridge Isolated DC-DC Converter with Zero Voltage Switching for a Wide Range of Operations and Suitable for Auxiliary Supply in EV; 37.54 L. [G460].
13. Shashank Vatedka; Classical and quantum error correcting codes and mathematics over finite fields for smart telecomm; 0 L. [DST/MA/F247-F228/2022-23/G485].
14. Shashank Vatedka; Distributed estimation and learning with limited communication; 30.51 L. [SERB/EE/F228/2022-23/G522].
15. Shubhadeep Bhattacharjee; Tunable Synaptic plasticity in Mos transistor for low-power spiking neural networks; 33.1 L. [SERB/EE/F279/2022-23/G497].
16. Shubhadeep Bhattacharjee; BEOL compatible MoS₂ synaptic transistors; 8 L. [ASCENT (Only consumables and travel grant)].
17. Shubhadeep Bhattacharjee; Heterogenous Integration of Neuromorphic Devices with 2D Semiconductors; 25 L. [EE/F279/2022-23/SG117].
18. Sri Rama Murty Kodukula; Recent Advances in Speech Recognition; 0.33 L. [QUALCOMM/EE/F001/2022-23/S221].
19. Sri Rama Murty Kodukula; Development of Real-time audio and speech processing modules for robot audition; 230.4 L. [RCI DRDO/EE/F001/2022-23/S232].
20. Sri Rama Murty Kodukula; Speech technologies in Indian languages under the project titled National Language Translation Mission(NLTM): BHASHINI; 86 L. [MEITY/EE/F001/2022-23/G459].
21. Sumohana S Channappayya; Development of Real-time Video perception capabilities Capabilities for an Autonomous Robot; 267.38 L. [RCI DRDO/EE/F100/2022-23/S231].
22. Sumohana S Channappayya; Network Design for Autonomous Navigation; 24.8 L. [TiHAN-IITH/EE/F261/2022-23/G489].
23. Sundaram Vanka; Network Design for Autonomous Navigation; 24.8 L. [TiHAN-IITH/EE/F261/2022-23/G489].
24. Sushmee Badhulika; 3D printed 2D-MoS₂ Triboelectric Nanogenerator for Self-Powering Sensor to detect Pre-diabetes in human breath; 1.12 L. [TATASTEEL/EE/F135/2022-23/S224].
25. Siva Rama Krishna Vanjari; Fabrication of high temperature piezo pressure sensor for Aeronautical application; 34L; [ARDB/EE/F029/2022-23/G505].
26. Shishir Kumar; Game-changing low-cost, accurate and user-friendly patch-clamp microfluidic chip-based system for measurement of ion-channel activity in live biological cells; 358280; [IITH/BT/F145/SOCH2].

Awards and Recognitions:

1. Aditya T Siripuram received Excellence in teaching at IIT Hyderabad.
2. Amit Acharyya & his students Nikhitha Avula and Tarun Gupta won Design & Verification Conference India 2022 Hackathon "AI on FPGA".
3. Murali K Rajendran (PhD 2020), who worked under Ashudeb Dutta and Gajendranath Chowdhary has been appointed as an Assistant Professor at National Institute of Technology, Tiruchirappalli.
4. Nagaveni PhD (2021), who worked under Ashudeb Dutta has been appointed as an Assistant Professor at IIT Dharwad.
5. Jose Titus received the "International Travel Grant" from the Science & Engineering Research Board, Govt. of India under the SERB-ITS scheme (2022) for attending the IEEE Industrial Electronics Conference in Belgium, Brussels in October 2022.

6. Kallor Joseph, Francis(PhD) who worked under Sumohana Channapayya and Rajya Laxmi received the Dutch personal grant VENI and as Assistant professor position at the University of Twente.
7. Pavan Kumar Reddy Manne (PhD 2021) who worked under Kiran Kumar Kuchi received IEEE GraTE'7 Best PhD Thesis Award 2022.
8. Lakshmi Prasad Natarajan received the INSA Young Scientist Award 2022.
9. Ravikumar Bhimasingu's paper titled "State of Charge Estimation of Li-ion Batteries through Efficient Gated Recurrent Neural Networks using Engineered features" received "Best Paper Award" under "Power and Energy Systems Track" at IEEE INDICON 2022 (IEEE 19th India Council International Conference, held during Nov 24-26, 2022 at Cochin, Kerala).
10. Shashank Vatedka has been elevated to Senior Member, IEEE.
11. Shashank Vatedka received the Best paper award (communications track) at the 2023 National Conference on Communications, IIT Guwahati, India (coauthored with PhD student Ritesh Kumar).
12. Kancharla Parimala (PhD 2022), who worked under Sumohana Channapayya appointed as an Assistant Professor at School of Computing and Electrical Engineering, IIT Mandi.
13. Sundaram Vanka has been the nominated Member, National Working Group-15 corresponding to ITU-T Study Group -15 regarding "Networks, Technologies and Infrastructures for Transport, Access & Home since 2022.
14. Sushmee Badhulika received 1st prize in Tata Steel Materials Next contest, 2022.
15. Sri Rama Murty Kodukula guided BTech EE students won second position worldwide in IEEE Signal Processing Cup, SPCUP, at ICASSP – 2022.
16. Vaskar Sarkar received the Best paper award in POWERCON 2022 for the paper "Accurate regulation of the power output of a two-stage photovoltaic system with minimal local energy storage".

Research Highlights:

Electrical Engineering Department, IITH is committed to pushing the boundaries of knowledge through research and innovation. In 2022, numerous things can be included; a few are the following.

1. Developed and integrated the indigenous 5Gi standard – Prof Kiran Kuchi:

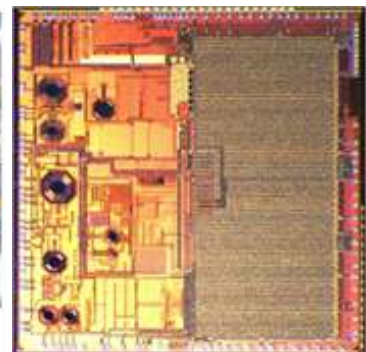
Prof Kiran Kuchi Developed and integrated the indigenous 5Gi standard, harmonizing it with the global 5G standard while protecting Indian intellectual property rights (IPR). Further, he introduced the world's first indigenous 5G modem System-on-Chip (SoC) called NB-IoT, enabling connectivity to terrestrial 5G base stations and satellites. This product has achieved commercial success. Additionally, Pioneered a novel 5G MIMO technology, successfully developed and introduced to the market.

Transceiver	3GPP TS36.211 Rel14 compliant
Bands Supported	1, 2, 3, 5, 8, 12, 13, 17, 18, 19, 20, 26, 28, 66, & L Band
Location	GPS, GLONASS, Galileo, NavIC Constellations
MCU	ARM Cortex M4
DSP	Yes, Separate
Interfaces	Digital GPIO, PWM, I2C, UART, Quad SPI
Fab	40nm TSMC
Dimensions	7mm x 7mm x 1mm

5G SoC Specifications



Extreme massive MIMO Lab Prototype



Magnified view of the 5G SoC Die

2. White Paper has been published on the prestigious Bharat 6G Alliance website – Prof Kiran Kuchi:

Prof. Kiran Kuchi and his R&D team authored a White Paper titled: "MEETING IMT2030 PERFORMANCE TARGETS: THE POTENTIAL OF OTFDM WAVEFORM AND STRUCTURAL MIMO TECHNOLOGIES." The White Paper has been published on the prestigious Bharat 6G Alliance website at: https://bharat6galliance.com/img/pdf/Whitepaper_on_The_Potential.pdf. The paper delves into several candidate technologies crucial for the development of 6G systems. Two key technologies, Orthogonal Time Frequency Division Multiplexing (OTFDM) waveform and Structural MIMO (S-MIMO), are examined in-depth.



White Paper has been published on the prestigious Bharat 6G Alliance website

3. IOT-enabled aquaculture monitoring system - Prof Shiv Govind Singh

The team led by Prof Shiv Govind Singh has focused on an IOT-enabled aquaculture monitoring system to assist fish farmers. Dr Singh interacted with nearby villagers and came to know that fish farming is their one of the major sources of income. Even after getting all the benefits of Government schemes, the profit margins are very less due to fish mortality, ignorance in fish farming, no control of water quality and other related parameters. His team took the challenge to support them technically by intimating water quality through a web application. Prof. Singh led another very important discovery in the domain of gas sensors. His team made a very significant contribution in this domain to overcome the very important problem in gas sensors. His team's discovery paved the way for room temperature, high selective, high sensitive mixed gas concentration and fast response perdition using an analytical model.



IoT-enabled aquaculture monitoring hardware—team meeting with framers at ground zero

4. Development of a speech interface to the command control system – Prof K Sri Rama Murty:

Dr K Sri Rama Murty led the development of a speech interface to the command control system, sponsored by DRDL - DRDO. Missile launch vehicles typically travel on rugged terrain. In such situations, it is extremely difficult to use a keyboard and mouse to interface with surveillance software and issue commands, including missile launches. The SIP lab at IITH has successfully developed and deployed a voice interface to interact with the surveillance/missile launching software. This software was received well by the users of DRDL and the Army and is being deployed on their vehicles. The major challenge in this project is the low SNR of the collected speech signals. A typical missile launching vehicle contains a couple of electric power generators, RADAR equipment, heavy-duty air conditioning units, and computing hardware, all packed into a small space, leading to high noise levels. The proposed speech interface is specifically designed to combat such high noise levels in missile launch vehicles.

5. 1. Designed fast, efficient and accurate image-matching algorithms for RGB and thermal aerial imagery - Prof Sumohana S Channappayya

Prof Sumohana S Channappayya and his team designed fast, efficient and accurate image-matching algorithms for RGB and thermal aerial imagery. Specifically, the algorithms are designed to run on a low-cost and low-resource hardware platform and deliver real-time performance. The intended applications are surveillance and reconnaissance.

Department of Entrepreneurship and Management

The Department of Entrepreneurship and Management is one of the recently established departments at IIT Hyderabad. The department's faculty strength increased by 3 in this year. We are joined by three new Assistant Professors: Dr Ranapratap Maradana, Dr Jayshree Patnaik, and Dr Rajesh Ittamalla. Dr B Ravi from IIT Bombay joined the department as an Adjunct Faculty during the year. The Department kickstarted the MTech in Techno Entrepreneurship Programme in July 2022 with 10 Students enrolled in the program in a Self-Sponsored Mode. The first batch of students enrolled in the MTech Dual Degree in Techno Entrepreneurship program passed out in July 2022. The department also offers a Minor in Entrepreneurship for the BTech Students.

For more information, please visit: <https://em.iith.ac.in/>

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Publications:

1. Patnaik J, & Bhowmick B. (2022). Determining appropriateness for management of appropriate technology: an empirical study using factor analysis. *Technology Analysis and Strategic Management*, 34(2). <https://doi.org/10.1080/09537325.2021.1890013>.
2. Banerjee S, Patnaik J, Bhowmick B, & Dan P K. (2022). Role of Academic Initiatives for Technology Management at the Base of the Pyramid: Empirical Evidence from India. *International Journal of Innovation and Technology Management*, undefined(undefined). <https://doi.org/10.1142/S0219877022500158>.
3. Patnaik J & Tarei PK. (2022). Analyzing appropriateness in appropriate technology for achieving sustainability: A multi-sectorial examination in a developing economy. *Journal of Cleaner Production*, 349(undefined). <https://doi.org/10.1016/j.jclepro.2022.131204>.
4. Ghadge A, Mogale D G, Bourlakis M, Maiyar L M, & Moradlou H. (2022). The link between Industry 4.0 and green supply chain management: Evidence from the automotive industry. *Computers & Industrial Engineering*, 169, 108303. <https://doi.org/10.1016/j.cie.2022.108303>.
5. Bindra S, Sharma D, Parameswar N, Dhir S, & Paul J. (2022). Bandwagon effect revisited: A systematic review to develop future research agenda. *Journal of Business Research*, 143. <https://doi.org/10.1016/j.jbusres.2022.01.085>.
6. Parameswar N, Dhir S, Khoa T T, Galati A, & Ahmed Z U. (2022). Dynamics of the termination of global alliances: probing the past, analyzing the present, and defining the frontiers for future research. *International Marketing Review*, 39(5). <https://doi.org/10.1108/IMR-01-2021-0046>.
7. Anand A, Buhagiar K, Kozachenko E, & Parameswar N. (2022). Exploring the role of knowledge management in contexts of crisis: a synthesis and way forward. *International Journal of Organizational Analysis*, <https://doi.org/10.1108/IJOA-02-2022-3156>.
8. Parameswar N, & Dhir S. (2022). Delhivery: Fulfilling E-commerce Delivery. *Asian Journal of Management Cases*, 19(2). <https://doi.org/10.1177/09728201221080684>.
9. Hasan Z, Parameswar N, & Ongsakul V. (2022). Multilevel analysis of factors influencing innovation through m-TISM approach. *Journal for International Business and Entrepreneurship Development*, 14(1). <https://doi.org/10.1504/JIBED.2022.124246>.
10. Praveen S V, & Ittamalla R. (2022). The General public's attitude toward governments implementing digital contact tracing to curb COVID-19 is a study based on natural language processing. *International Journal of Pervasive Computing and Communications*, 18(5). <https://doi.org/10.1108/IJPCC-09-2020-0121>.
11. Sv P, Lorenz J M, Ittamalla R, Dhama K, Chakraborty C, Kumar D V S, & Mohan T. (2022). Twitter-Based Sentiment Analysis and Topic Modeling of Social Media Posts Using Natural Language Processing to Understand People's Perspectives Regarding COVID-19 Booster Vaccine Shots in India: Crucial to Expanding Vaccination Coverage. *Vaccines*, 10(11). <https://doi.org/10.3390/vaccines10111929>.
12. Sv P, Ittamalla R, & Balakrishnan J. (2022). Analyzing general public's perception on posttraumatic stress disorder and COVID-19: a machine learning study. *Journal of Loss and Trauma*, 27(7). <https://doi.org/10.1080/15325024.2021.1982558>.
13. Sv P, & Ittamalla R. (2022). What concerns the general public the most about monkeypox virus? – A text analytics study based on Natural Language Processing (NLP). *Travel Medicine and Infectious Disease*, 49(undefined). <https://doi.org/10.1016/j.tmaid.2022.102404>.
14. Praveen S V, Ittamalla R, & Subramanian D. (2022). Challenges in successful implementation of Digital contact tracing to curb COVID-19 from global citizen's perspective: a text analysis study. *International Journal of Pervasive Computing and Communications*, 18(5). <https://doi.org/10.1108/IJPCC-09-2020-0147>.
15. Praveen S V, Ittamalla R, & Subramanian D. (2022). How optimistic do citizens feel about digital contact tracing? – Perspectives from developing countries. *International Journal of Pervasive Computing and Communications*, 18(5). <https://doi.org/10.1108/IJPCC-10-2020-0166>.
16. Ittamalla R, & Srinivas Kumar D V. (2022). An empirical investigation of the impact of service experience on emotions, satisfaction, and loyalty for theme park visitors. *International Journal of Business Excellence*, 26(4). <https://doi.org/10.1504/IJBEX.2022.122749>.
17. Ajoy K Sarangi, Rudra P Pradhan, Tamal Nath1, and Hiranmoy Roy. (2022). How Does Innovation Affect Economic Growth? Evidence from G20 Countries. Sage Publications. <https://doi.org/10.1177/0019466221106356>.

Funded Research Projects:

1. Nakul Parameswar; Competitiveness of Indian Technological Start Ups-An Exploratory Study; 6.6 L. [ICSSR/E&M/F269/2022-23/G468].
2. Rajesh Ittamalla; Start-up Branding: Determinants,

Dynamics, and Management Strategies; 13 L. [SG/IITH/F318/2022-23/SG-149].

3. Rajesh Ittamalla; Creating Agritourism Experiences: Customers Perspectives, Service Providers' Perspectives, and Entrepreneurial Perspective; 12 L. [ICSSR/DEM/F318/2023-24/G561].

2. Lohithaksha Maniraj Maiyar received 3rd best prize for jointly co-authored conference presentation of PhD student Ms Indira Roy on "Omnichannel distribution network design for fresh-food procurement considering freshness keeping Effort and food quality loss" at the International Conference on Data Analytics in Public Procurement and Supply Chain 2022 (ICDPAS2022)" jointly organized by NITIE, Mumbai and AJNIFM, Faridabad. It involved a cash prize of Rs 50,000 to the team of co-authors.

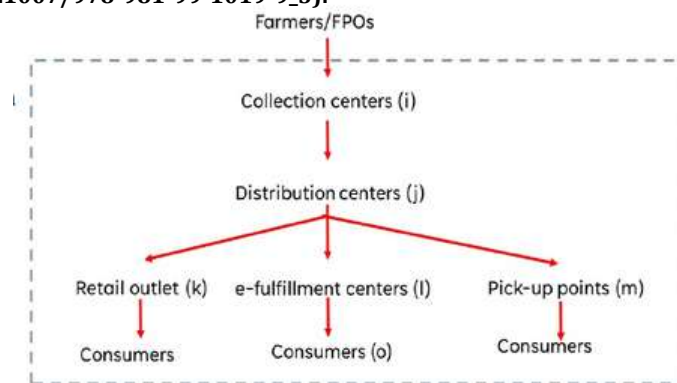
Awards & Recognitions:

1. Lohithaksha Maniraj Maiyar received top reviewer recognition from Cogent Engineering journal, Taylor and Francis for reviewing papers for the journal in past 4 years as on 12 September 2022.

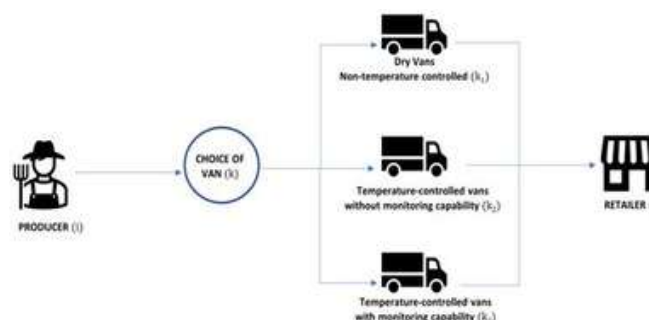
3. Ms Indira Roy, Ph. D Scholar working with Dr. Lohithaksha M Maiyar was selected for the prestigious Prime Minister's Research Fellowship programme in the lateral entry mode during the year.

Research Highlights

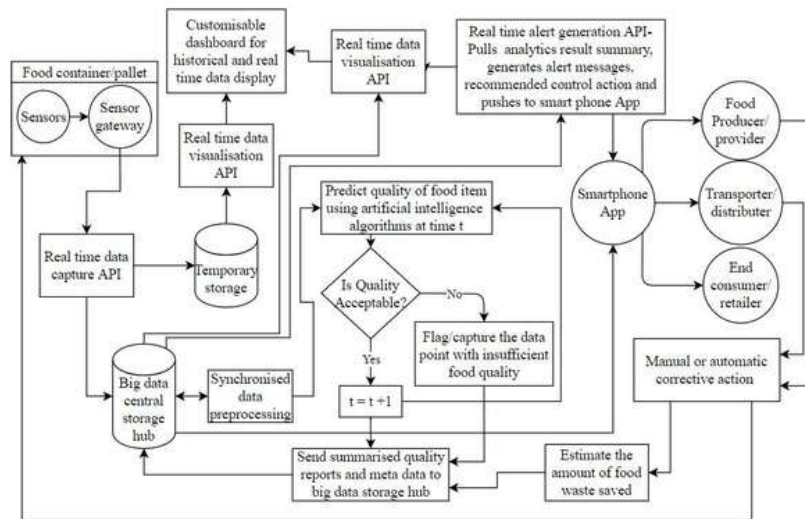
1. Research being undertaken in the areas of - Frugal Innovation, Sustainable Food Supply Chain, Startup Branding and New Venture Marketing, Venture Capital Investment and Innovation, Financial Inclusion, Women in Entrepreneurship and Competitiveness of Tech Start-ups.
2. Omni-Channel Distribution Network Design for Fresh Food Procurement Considering Freshness-Keeping Effort and Food Quality Loss co-authored by Indira Roy and Lohithaksha M Maiyar (DOI: https://doi.org/10.1007/978-981-99-1019-9_5):



3. A Decision Support Model for Cost-Effective Choice of Temperature-Controlled Transport of Fresh Food co-authored by Lohithaksha M Maiyar, Indira Roy, Ramakrishnan Ramanathan and Usha Ramanathan (DOI: <https://doi.org/10.3390/su15086821>):



4. Fighting food waste: How can Artificial Intelligence and Analytics help? Co-authored by Lohithaksha M Maiyar, Ramakrishnan Ramanathan, Shanta Lakshmi Belavadi Nagaraja Swamy and Usha Ramnathan (DOI: https://doi.org/10.1142/9781786349989_0008):



Highlights

The Department undertook many activities during the year to promote and nurture an entrepreneurial mind set and innovative thinking among the students of IIT Hyderabad. A few notable programmes undertaken during the year are:

1. The Department of Entrepreneurship and Management under the aegis of the Institute Innovation Council (IIC_IITH) organized a Fireside Chat with BoG Chairman Dr BVR Mohan Reddy for the Book Launch Event of "Engineered in India: From Dreams to Billion \$ Cyient" for IITH Innovation Day on 7th January 2023.



2. The Department of Entrepreneurship and Management under the aegis of the Institute Innovation Council (IIC_IITH) along with iTIC IIT Hyderabad and Zinnov conducted a Webinar on "Evolution of Technology Startup Landscape in India' - A Debriefing Session" on 21st March 2023.



3. E-cell and the Department of Entrepreneurship and Management, in association with IIT Hyderabad Alumni Association, under the aegis of the Institute Innovation Council, organized the “Business Plan Development Challenge LEAD Pitch” competition to foster leadership and creativity among Japanese and Indian students on 16th March 2023.



4. E-Cell and the Department of Entrepreneurship and Management, under the aegis of the Institute Innovation Council (IIC_IITH), organized an interactive session “Students’ Grilling Professors on Entrepreneurship” for students on 27th March 2023. Prof B Ravi, Adjunct Faculty, spearheaded the event along with Dr MP Ganesh, Head of Department, Dr Nakul Parameswar, and Dr Jayshree Patnaik from the Department.



The flagship Entrepreneurship Talk Series organized by the Department of Entrepreneurship and Management gained further traction in the year 2022-2023, wherein 12 talks were undertaken as part of the series (details of these talks are mentioned below):

1. Mr Shiladitya Mallik; Co-founder and Chief Business Officer, SmartWinnr; Idea, Productization, Market Positioning And Need For Future Plans.
2. Mr Pankaj Dubey; Founder, DSPIN; Consulting Startup Ideation, Funding, Risk-Taking, Opportunity, Critical Thinking, Building Teams, Raising Capital, And Learning From Failures.
3. Mr Saurabh Jain; Founder & CEO, Fun2doLabs; The Entrepreneurial Perspectives And Real-Life Challenges That The Youth Should Solve.
4. Mr Samyak Jain; Founder & CEO, Myways.ai; Instilling Entrepreneurial Mindset Among Students Right from College.
5. Ms Deepshikha Kumar; Founder & CEO, Speakin Asia; Idea Execution, Importance of Internship.
6. Mr Ajay Jain; Founder & Managing Partner, Silverneedle Ventures; Problem-Solution Fit and Product-Market Fit.
7. Mr Manish Advani; Founder & CEO of MIMO Potentio; Entrepreneurship Skills & Motivation.
8. Ms Namratha Vedire; Director, Platform & Operations at 'Engage'; Process Of Innovation Development and Commercialization.
9. Mr Venus Desai; Co-Founder & CEO, NuGen Systems; Converting Innovation into Startup.
10. Ms. Shweta Suresh Thakare; Co-Founder of GramHeat; Impact Of Social Enterprise and Challenges.
11. Mr Suresh Susurla; CEO and MD of Startoon Labs Pvt Limited; Prototype/Process Design and Development.
12. Mr Srinivas Raghavan; N CTO of StartupXSeed; Product-Market Fit, And Reasons for Failure.

Department of Liberal Arts

The Department of Liberal Arts at IIT Hyderabad is one of the leading centers in the nation today for the study of Humanities and Social Sciences along with various dimensions of the creative and performing arts. While the department is founded on the traditional model of intellectual inquiry, it seamlessly amalgamates this with contemporary scholarly discourses of a globalized and technologized world. The department has grown especially over the last few years and currently boasts a team of twenty exceptionally gifted and dedicated full-time faculty members. Liberal Arts at IIT Hyderabad is also proud to have associated with it many eminent academics and professional practitioners as Adjunct Faculty. The latest names to be added to this group include renowned Western classical musician Mr Timothy Marthand and noted Educationist and Economist Prof Jandhyala B G Tilak. Where student achievements are concerned, the department is proud to have graduated two batches of Master's students this year with degrees in Development Studies and Health, Gender, and Society. More important, our former Master's students from Development Studies, Ms Keertana Kannabiran Tella—who published a book entitled *Abortion Rights, Reproductive Justice and the State: International Perspectives* (by Routledge)—and Shweta Thakare—who successfully initiated GramHeet or an AgriTech startup (with her husband Pankaj Mahalle)—have done us extremely proud. In fact, Ms Thakare was also featured in the “Forbes Asia 100 to Watch List”! Likewise, several doctoral scholars who have graduated from our department have joined many premier institutes as faculty and have kept the flag flying for the Department of Liberal Arts. The most recent additions to this group include Dr Sudarshan R Kottai, who has joined the Department of Humanities and Social Sciences at IIT Palakkad as an Assistant Professor, and Dr Sanjiv Kumar, who has joined the Department of Economics Sciences at IIT Kanpur as Assistant Professor. In addition, some of our doctoral scholars, such as Meghna Amin, have received the prestigious Fullbright-Nehru Scholarship.

In terms of faculty achievements, we have had several moments of glory over the last one year. While faculty publications include books brought out by reputed presses such as Routledge, Lexington Press, and Orient Blackswan, faculty journal publications have been equally stellar. Some of the most noted journals in the fields of Humanities and Social Sciences such as *Engaging Science, Technology, and Society*; *Journal of South Asian Development*; *Mental Health, Religion and Culture*; *Feminism & Psychology*; *Economic Analysis and Policy*; *Text and Performance Quarterly*; *The Journal of International Trade & Economic Development*; *Environment & Development Economics*; *Economic Analysis and Policy*; *International Journal of Business Excellence*; *Menopause*; *ANQ: A Quarterly Journal of Short Articles, Notes and Reviews*; *Eneuro*; *Integrative & Communicative Biology*; *Anthropology & Medicine*; and *Lit: Literature Interpretation Theory*, to name a few, have featured scholarly articles by the faculty of Liberal Arts. In addition, the department currently has several ongoing research projects with Liberal Arts faculty members functioning as Principal Investigators. Some of the most important names amongst these projects have been funded by the Economic and Social Research Council (ESRC), United Kingdom, Sree Padmavathi Venkateswara Foundation (SreePVF), the International Rice Research Institute, and SPARC, among others.

With such academic signposts as a backdrop in addition to several ongoing national and international collaborations with universities such as George Mason University, Swinburne, and Monash, and many other names in the pipeline, the department looks forward to not just a national but also a global presence in the near future. The present times demand a robust knowledge economy that bridges the gap between academic deliberations and societal transformation. The Department of Liberal Arts at IIT Hyderabad, by fostering the *carpe diem* spirit, aspires toward just that.

For more information, please visit: <https://la.iith.ac.in/>

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Books:

1. Amrita Datta; Single-authored book: Migration and Development in India: The Bihar Experience. Routledge, Taylor, and Francis. (2022). <https://www.routledge.com/Migration-and-Development-in-India-The-Bihar-Experience/Datta/p/book/9781032291833>.
2. Chandan Bose and Mira Mohsini (editors). Encountering Craft: Methodological Approaches from Anthropology, Art History, and Design. <https://www.routledge.com>.
3. Shuhita Bhattacharjee; Monograph; Postsecular Theory: Texts and Contexts; Shuhita Bhattacharjee (Author), Sumit Chakrabarti (Ed.); Orient Blackswan, 2022. <https://orientblackswan.com>.
4. Srirupa Chatterjee and Swathi Krishna S (editors). Gendered Violence in Public Spaces: Women's Narratives of Travel in Neoliberal India. <https://rowman.com>.

Book Chapters:

1. Amrita Deb; Published a chapter in a Textbook for postgraduate psychology students. Deb, A. (2022) Block 3, Unit 9: Resilience research and applications. In MPCE-046, Applied Positive Psychology, Indira Gandhi National Open University.
2. Chandan Bose; Covid-19 Stories: Imaginations of the Local. (2022). Book chapter in edited volume Pandemic of Perspectives: Creative Re-imaginings, edited by Rimple Mehta, Sandali Thakur, and Debaroti Chakraborty, Routledge, London.
3. Shuhita Bhattacharjee; Book Chapter: 'Rosy Ki Khwaheeshein': Scripted Romance and Acquaintance Rape in Alankrita Shrivastava's Oeuvre of Female Desire," In Women Filmmakers in Contemporary Hindi Cinema: Looking through their Gaze. Edited by Aysha Iqbal Viswamohan. Palgrave Macmillan <https://link.springer.com/book/9783031102318>.

Publications:

1. Khandekar A. (2022). Aalok Khandekar. Interactions, 29(1). <https://doi.org/10.1145/3505282>.
2. Angela Okune, Grant Jun Otsuki, Tim Schutz, Clément Dreano, Noela Invernizzi, Duygu Kasdogan, Ali Kenner, Aalok Khandekar, Sujatha Raman, Federico Vasen, Amanda Windle, and Emily York. "Open Research Data: Experimenting towards a Publishing Infrastructure." Engaging Science, Technology, and Society 8(1): 1-13. <https://doi.org/10.17351/ests2022.1885>.
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Building Community with ESTS. Engaging Science, Technology, and Society 8(1): 1-8. <https://doi.org/10.17351/ests2022.1671>.

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Scotland. (2022). Zoe Skoulding, Poetry & Listening: The Noise of Lyric (2020). *Journal of British and Irish Innovative Poetry* 14(1). doi: <https://doi.org/10.16995/bip.9753>.

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54. Mondal P. (2022). Disunity with unity in cognition within the context of language–biology relations. *Journal of Theoretical and Philosophical Psychology*, 42(1). <https://doi.org/10.1037/teo0000156>.

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and Autonomy: Radical Mothering in Mona Simpson's *Anywhere but Here*. *Critique - Studies in Contemporary Fiction*, 63(2). <https://doi.org/10.1080/00111619.2021.1959291>.

Funded Research Projects:

1. Aardra Surendran; Labour Migration networks in the Construction industry in Bangalore; 6 L. [ICSSR/LA/F265/2022-23/S257].
2. Amrita Datta; Odisha Migration Study(OMS); 158 L. [OMS/LA/F221/2022-23/S252].
3. Anindita Majumdar; Kings college Social Science & Public Policy global fellowship 2023; 0.07 L. [KINGS COLLEGE/LA/F187/2022-23/S259].
4. Chandan Bose; Intimacy and Risk: Understanding violence taking place through queer dating applications in contemporary India; 15 L. [ICSSR/LA/F211/2022-23/G544].
5. Gaurav Dhamija; Odisha Migration Study(OMS); 1.96 L. [OMS/LA/F221/2022-23/S252].
6. Haripriya Narasimhan; Odisha Migration Study(OMS); 1.96 L. [OMS/LA/F221/2022-23/S252].
7. K P Prabheesh; Covid-19 uncertainty and monetary policy; 1.71 L. [APAEA/LA/F007/2022-23/S264].
8. M P Ganesh; Odisha Migration Study(OMS); 1.96 L. [OMS/LA/F221/2022-23/S252].
9. M P Ganesh; Competitiveness of Indian Technological Start Ups-An Exploratory Study; 6.6 L. [ICSSR/E&M/F269/2022-23/G468].
10. Mahati Chittam; Study of calcium channel expression and calcium dynamics in cells derived from Indian breast cancer patients; 53 L. [ICMR/BT/F145/2022-23/G536].
11. Prakash Chandra Mondal; Semantic Processes in Bilingual Children and Factors Affecting Them; 21 L. [DST-CSRI/LA/KK/2021-22/PDF-54].
12. Shuhita Bhattacharjee; Risk and Intimacy: Understanding Violence taking place through Queer Dating Applications in Contemporary India; 15 L. [FNo 02/155/2022-23/ICSSR/RP/MJ/GEN].

Awards & Recognitions:

1. Bhushan Praveen Jangam, PhD (2018), who worked under the guidance of Badri Narayan Rath, has been appointed as an Assistant Professor in the School of Management and Entrepreneurship at IIT Jodhpur.
2. Chandan Bose received the Major Research Project

Grant of Rupees Fifteen Lakhs from the Indian Council of Social Science Research (ICSSR).

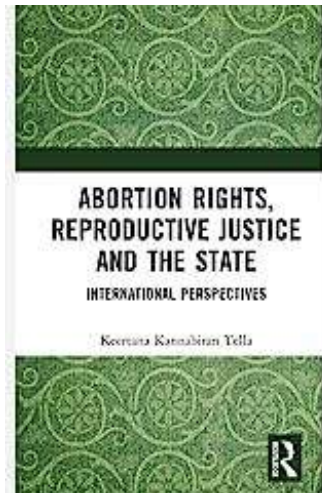
Project Grant of Rupees Fifteen Lakhs from the Indian Council of Social Science Research (ICSSR).

3. Rakesh Pradhan, integrated PhD (2021), who worked under the guidance of Prabheesh K P, was offered a faculty position (AP, grade II) at the Dept of Management Studies, IIT Roorkee.
4. Vineet Gairola, PhD Scholar, working under the guidance of Shubha Ranganathan, received the Emerging Scholar Award 2023 during the Thirteenth International Conference on Religion & Spirituality in Society by Religion in Society Research Network USA.
5. Shuhita Bhattacharjee received the Major Research
6. Shweta Thakare (MA - Development Studies-2021) being featured in 'Forbes Asia 100 to Watch List' for her Startup GramHeet.
7. Srirupa Chatterjee has been selected as Editorial Board Member of Humanities & Social Sciences Communications (Springer Nature).
8. Swathi Krishna S, PhD (2018), who worked under the guidance of Srirupa Chatterjee, has been appointed as an Assistant Professor in the School of Humanities, Social Sciences, & Management at IIT Bhubaneswar.

Research Highlights

Student Achievements:

Abortion Rights, Reproductive Justice, and the State: International Perspectives by Keertana Kannabiran Tella. "This book looks at the trajectories of reproduction and abortion rights in diverse socio-cultural contexts in various countries, and the regional concerns which animate these discourses." (<https://www.routledge.com>)



Research Facilities:

Cognitive Science Lab

This lab focuses on the "Nature of plasticity in somatosensory cortex and its role in motor learning and memory consolidation" and the "Role of motor and sensory areas in short and long-term motor learning consolidation," among others. (<https://la.iith.ac.in/research.html#headmenu>)



Linguistics Lab

This lab focuses on "Formulating Meaning Relations for the Computational Implementation of Natural Language Understanding" and "Unifying Principles of Cognition and Emotion for Neural Network Implementation," among others. (<https://la.iith.ac.in/research.html#headmenu>)



2-channel electrologlograph (EG2-PC)

Development Studies Lab and Economics Lab

Development Studies group works on “Labour Supply Chains in the Construction Industry: Circular Migrants, Contracting, and Covid,” “Labour Migration Networks in the Construction Industry in Bengaluru,” and “State, Society, and Sport: A Social History of Women’s Athletics in Kerala” among many others. (<https://la.iith.ac.in/research.html>).

The Economics group focuses on “Economic Growth and Development, Industrial Economics, Econometrics,” “Development Economics, Health Economics, Gender Economics, Applied Microeconomics,” “Monetary Economics, Public Economics, Time Series Analysis” and “Macro & Monetary Economics, International Finance, Econometrics” (<https://la.iith.ac.in/faculty.html>)

- Development studies lab



Consumer Pyramids Household Survey (CPHS)

- Economics Lab



Department of Materials Science & Metallurgical Engineering

Namaskar!

We are in the second year of staying in our permanent abode. This year, the Materials Science and Metallurgical Engineering (MSME) department has increased its strength of Faculty to twenty-one and Staff to thirteen. We are joined by three new Assistant Professors: Dr Piyush Jagtap, Dr Anuj Goyal, and Dr Suresh Perumal; one Adjunct Professor, Dr Tata Narasinga Rao (Director ARCI); two Distinguished Professors, Prof Nobuhiro Tsuji from Kyoto University, Japan and Prof Christopher Berndt from Swinburne University, Australia and one Technical Superintendent: Mr Mohammad Abdul Junaid.

Under MSME's efforts on upskilling, Professional Development Workshops on various scientifically helpful topics were conducted on a regular basis by Dr Shourya Dutta Gupta and Colleagues to all IIT Hyderabad students. On a similar note, finally, the MSME could initiate the IIM Hyderabad Student Chapter at IIT Hyderabad and hold several exciting talks by calling noted speakers.

Encouraged by the government's initiative on India Semiconductor Mission, the MSME started with the country's first Semiconductor Materials and Devices MTEch program. This niche program shall address the required skilled manpower for the semiconductor industries of India.

Several faculty members brought many research projects from various public/private agencies worth around INR 4.57 crores. More exciting scientific outcomes are mentioned alongside each faculty's profile in this annual report.

This year was special for our students for in-campus job placements. For the first time, the MSME PhD scholars are placed directly into R&D labs through the office of career services of IIT Hyderabad while doing their PhD. Also, for the first time, full placements of the MTEch students happened through the office of career services of IIT Hyderabad.

For more information, please visit: <https://msme.iith.ac.in/>



Faculty

Head of the Department



Suhash Ranjan Dey

PhD - University Paul-Verlaine -
Metz, France

Professor

Profile

[page:https://iith.ac.in/msme/suhash/](https://iith.ac.in/msme/suhash/)

Professor



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Associate Professor



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Mayur Vaidya
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Adjunct Professor



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<https://www.arci.res.in/people-pages/1674039028-tn-rao-cv.pdf>

Patents:

Filed:

1. Mudrika Khandelwal; Bacterial Cellulose Based Microfluidic PoC Device for AST; 202241030646.

Published:

1. Chandrasekhar Murapaka; Reconfigurable Logic Via Gate Controlled Skyrmion Motion; 202141057701.
2. Chandrasekhar Murapaka; Skyrmion Based Majority Logic Gate in A Nanomagnetic Device; 202241010372.
3. Chandrasekhar Murapaka; Nife/Femn Exchange Biased Systems for Bias-Field- Free Magnetization Dynamics; 202241051146.
4. Mudrika Khandelwal; Pharmaceutical Compositions and Delivery Systems for Prevention and Treatment of Candidiasis; US 17/276,478.
5. Ranjith Ramadurai; Ferroelectric Polymer (B-Pvdf) For Control and Mitigation of Microbes Under Small Voltage Signals; 202041050666.
6. Ranjith Ramadurai; A Device Configurable in a Microscope for Real Time Testing and Imaging of a Sample; 202041053912.

Publications:

1. Kamaraj A, Mandal G K, Shanmugam S P, & Roy G G. (2022). Quantification and analysis of slag carryover during liquid steel tapping from BOF vessel. Canadian Metallurgical Quarterly, 61(2). <https://doi.org/10.1080/00084433.2022.2044688>.
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8. Naganaboina V R, Anandkumar M, Deshpande A S, & Singh S G. (2022). Single-Phase High-Entropy Oxide Nanoparticles for Wide Dynamic Range Detection of CO₂. ACS Applied Nano Materials, 5(3). <https://doi.org/10.1021/acsnm.2c00855>.
9. Naganaboina V R, Bonam S, Anandkumar M, Suresh Deshpande A, & Singh S G. (2022). Humidity-Independent Methane Gas Detection in Gd_{0.2}La_{0.2}Ce_{0.2}Hf_{0.2}Zr_{0.2}O₂-Based Sensor Using Polynomial Regression Analysis. IEEE Electron Device Letters, 43(12). <https://doi.org/10.1109/LED.2022.3215616>.
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Funded Research Projects:

1. Atul Suresh Deshpande; Pressureless fabrication of carbon foam using bituminous coal for ablative applications; 54.6 L. [G-353].
2. Chandrasekhar Murapaka; Development of novel spin Hall materials for spin-orbit torque based memory and logic devices; 20 L. [JICA-AC2023-07].
3. Chandrasekhar Murapaka; Spintronics based Digital logic Architecture Design for AI Applications; 60 L.

[SERB/EE/F091/2022-23/G546].

4. Chandrasekhar Murapaka; Ferrimagnet based artificial synaptic device for neuromorphic computing; 64.84 L. [SERB/MSME/F206/2022-23/G520].
5. Chandrasekhar Murapaka; Harnessing Pure Spin Current by Tailoring molecular spinterface; 30.04 L. [BRNS/MSME/F206/2022-23/G472].
6. Pinaki Prasad Bhattacharjee; Development of Borated Steels; 22 L. [S-227].
7. Ramadurai Ranjith; Through-process modeling of DS/SC superalloy turbine blades processed using modified bridgman route-validation with CMSX-4 alloy; 107.09 L. [ARDB(DRDO)/MSME/2022-23/G479].
8. Saswata Bhattacharya; Through-process modeling of DS/SC superalloy turbine blades processed using modified bridgman route-validation with CMSX-4 alloy; 107.09 L. [ARDB(DRDO)/MSME/2022-23/G479].
9. Saswata Bhattacharya; Assessment of high-fidelity diffusion coefficients in Ni-Al-X alloys and Ostwald ripening; 49.72 L. [SERB/MSME/F119/2021-22/G455 (Sanction date: February 2022)].
10. Saswata Bhattacharya; Computational approach using machine learning, CALPHD and first principal calculations for accelerated development of complex concentrated alloys; 29.9 L. [DMRL/MSME/2022-23/S258].
11. Subhradeep Chatterjee; National Center for Clean Coal Research & Development WP8 Welding.; 10.42 L. [G158].

Jamshedpur, "Preparation and Certification of Hydrogen Standard in Steel (OLP 370, PI: Ashok K)."

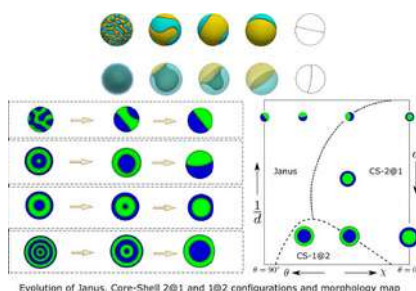
3. Ashok K received one of the top 3 nominees for the Institution of Engineering and Technology (IET) India Awards 2022 for the Youth Engineering Icon Award category.
4. Chandrasekhar Murapaka has been the visiting Faculty to NIMS Japan.
5. Chandrasekhar Murapaka has been the visiting Faculty to NTU Singapore.
6. Dr Mudrika Khandelwal received Women Excellence Award 2022 from SERB.
7. Pinaki Prasad Bhattacharjee received the ASM-IIM Visiting Lectureship to North America.
8. Ranjith Ramdurai has been inducted in the Journal of Physics D Applied Physics.
9. Saswata Bhattacharya has been the Invited to be the guest editor for "Crystals" for a special issue on "Phase-field Modeling".
10. Suhash Ranjan Dey has been member of the National Organizing Committee of Indian Institute of Metals ATM 2022, Hyderabad, India.
11. Kunda Siri Kiran Janardhana Reddy, student of Suhash Ranjan Dey received Best Poster Award 2022 IIM-ATM 2022.
12. Suhash Ranjan Dey has been selected as Associate Editor in the Editorial Board of Bulletin of Materials Science (Impact Factor 1.878).
13. Suhash Ranjan Dey received Research Excellence Award 2022 under the PhD Category (Mr Kunda Siri Kiran Janardhana Reddy).

Awards & Recognitions:

1. Ashok K received the Young Metallurgist Award 2021 from the Ministry of Steel, Govt of India.
2. Ashok K received Prof Shilowbadra Banerjee Award (for the best In-house project) from CSIR NML,

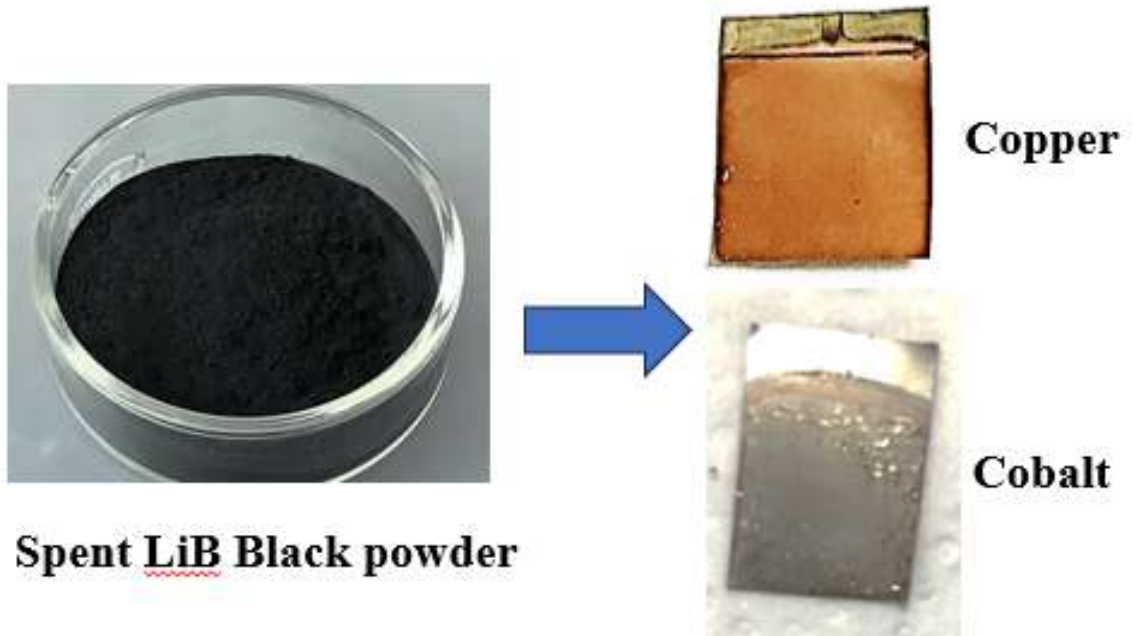
Research Highlights:

1. **Competition of Core-Shell and Janus Morphology in Bimetallic Nanoparticles: Insights from a Phase-Field Model published in Acta Materialia, co-authored - Dr Saswata Bhattacharyya and Dr Subhradeep Chatterjee.**



Evolution of Janus, Core-Shell 2@1 and 1@2 configurations and morphology map

2. TATA MaterialNEXT 3.0 Grande Finale on "Recovery of cobalt from spent lithium-ion batteries" by the Research group - Prof Suhash Ranjan Dey.



Recovery of cobalt from spent lithium-ion batteries

Department of Mathematics

The Department of Mathematics, founded along with the Institute in 2008, aspires to evolve into an internationally acclaimed center for theoretical, interdisciplinary, and applicable mathematical research, supporting and complementing the expertise extant in and around Hyderabad. As one of the basic science departments, the department remains the fulcrum of teaching that offers a large share of the science credits for the entire community of students at IIT Hyderabad.

Our masters' students have done well in competitive exams, with many of them landing doctoral positions in various IITs and other national institutes of excellence - proof enough that the department was able to mitigate the effect of the pandemic through its innovative modes of instruction and discussion. The challenge thrown by the pandemic did not deter the department, which was quick to make up for the lost time and has kept up its research output both in terms of quantum and quality, as is visible from the impressive list of journals that have featured our submissions and the post-doctoral positions obtained by our recent graduates."

The department is proud to see the passing out of its students from the BTech (Mathematics and Computing) program with a 100% placement record, with student remunerations far exceeding the institute's average. We congratulate each of these pioneers who had placed their faith in us and have done us proud.

For more information, please visit: <https://math.iith.ac.in/>

Faculty

Head of the Department



Lakshmi Narayana P A

PhD - IIT Kharagpur

Professor

Profile page:

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Professor



Balasubramaniam Jayaram

PhD - Sri Satyasai Institute of Higher Learning

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Ramesh G

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Subrahmanya Sastry Challa

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Associate Professor



Pradipto Banerjee

PhD - University of South Carolina

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<https://iith.ac.in/math/pradipto/>



Sukumar D

PhD - IIT Madras

Profile page:

<https://iith.ac.in/math/suku/>



Tanmoy Paul
PhD - ISI Calcutta
Profile page:
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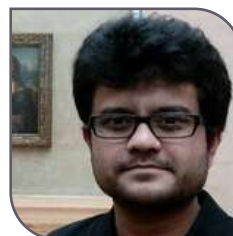
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Publications:

1. Sebastian R & Tripathi A. (2022). Rank 2 Ulrich bundles on the general double plane cover. *Journal of Pure and Applied Algebra*, 226(2). <https://doi.org/10.1016/j.jpaa.2021.106823>.
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Funded Research Projects

1. Pradipto Banerjee; Investigations into algebraic properties of integer polynomials; 2.2 L. [G443].
Challa Subrahmanya Sastry; Sparse Approximations with Prior Support Constraint and Application to Interior Tomography; 15.16 L.
2. G Ramesh; Invariant subspaces of a subclass of norm attaining operators; 6.0 L. [G294].
3. Balasubramaniam Jayaram; Monotone Metric Spaces in Machine Learning; 2 L. [MTR/2020/000506].
4. Deepak Kumar Pradhan; Interpolation Problems; 35 L. [DST/MATH/F316/2022-23/G529].
5. Venkata Ganapathi Narasimha Kumar Cheraku; Sign changes for the product of the Fourier coefficients of Hilbert modular forms; 2.2 L. [G198].

Awards and Recognitions:

1. Pradipto Banerjee received the Teaching Excellence Award, IIT Hyderabad, 2023.

Highlights:

1. National Conference on Commutative Algebra and Algebraic Geometry (CoCAAG 2023)

The conference is aimed at two major topics: Commutative Algebra and Algebraic Geometry, to promote the research activities. The four-day scientific event will bring together reputed mathematicians, young researchers, and graduate students working in commutative algebra and algebraic geometry from across the nation for fruitful discussions and exchange of ideas for research collaborations. The event will include invited talks, contributed talks, and poster presentations.

Organizers

- Dr Neeraj Kumar, Department of Mathematics, IIT Hyderabad (Convener)
- Dr Amit Tripathi, Department of Mathematics, IIT Hyderabad
- Dr Mrinmoy Datta, Department of Mathematics, IIT Hyderabad
- Dr Maria Francis, Department of Computer Science and Engineering, IIT Hyderabad

Sponsors:

- SERB (Science and Engineering Research Board), Govt. of India (Scheme: Assistance to Professional Bodies and Seminar Symposia).
- NBHM (National Board for Higher Mathematics), Department of Atomic Energy (DAE), Govt. of India (Scheme: Financial Assistance for Holding National and International Conferences).
- Department of Mathematics (IIT Hyderabad).
- Personal Project Grant (Dr. Neeraj Kumar, Dept. of Mathematics, IIT Hyderabad)



Snapshots from CoCAAG 2023 Conference

2. National Mathematics Day 2022 Celebration

Department of Mathematics, IIT Hyderabad decorously celebrated National Mathematics Day on Dec 22, 2022, on the occasion of the 135th birth anniversary of the great Mathematician Sri Srinivasa Ramanujan with inaugural remarks by Professor B S Murty, a talk on “Number theoretic problems solved over the pandemic” by professor Rajat Tandon, University of Hyderabad, and a talk by Dr Neeraj Kumar, IITH on “Generating functions,” followed by Prize distribution to winners of DAV Campus School Mathematics Quiz.



National Mathematics Day 2022 Celebration

3. National Mathematics Day 2022 Celebration

Department of Mathematics, IIT Hyderabad, has successfully concluded the workshop on “Advanced Functional Analysis and its Applications - 2022”. One of the fundamental subfields of analysis is functional analysis. This subject is offered at both the Master's and research levels by a number of universities and institutions. Depending on the needs of the teacher, this subject can be taught from a variety of perspectives. However, its core is the study of normed spaces, along with the study of function spaces over various domains, and the behaviour of the operators on normed spaces from both the linear and nonlinear point of view. Functional analysis, in its broad sense, includes the study of various aspects of topologies on vector spaces, stochastic theory, non-commutative harmonic analysis and many more. This topic is also used by students of mathematical economics, financial mathematics, actuarial science, electrical mechanical engineering. Our main goal is to provide some cutting-edge subjects in this area that will be beneficial to both lecturers and research scholars. An extensive knowledge of the relevant subject and its related domains is essential for a lecturer. We think that by attending this workshop, people will have a deeper understanding and exposure to the subject.



Snapshot from Advanced Functional Analysis and its Applications - 2022

Department of Mechanical and Aerospace Engineering

New Faculty Dr Prakhar Gupta, Dr Vishu Unni, Dr Anurup Datta, Dr Prabhat Kumar, and Dr Sachidananda Behera joined the Department this year, bringing the total faculty strength to 32. We have started a new BTech program on Computational Mechanics spearheaded by Dr Niranjana Ghaisas. Dr K Badarinath, Dr V C Prakash, and Dr Venkata Subbiah were inducted into the reputed International Journal editorial board. Department Faculty colleagues received several projects from DST, Honeywell, DRDO, and other funding agencies. The work of Srinath Gudur and Shivam Shukla titled "Controlling waviness in additive manufacturing of thin walls by laser directed energy deposition process" has been selected for the best paper award at the AIMTDR Conference. This work is carried out with the guidance of Dr Gopinath and Dr Suryakumar. Ms Smita Santram Sontakke, Arkajyoti Jha, and Vinod V have been awarded the Prime Minister's Research Fellowship (PMRF).

A research article published by our PhD student Junaid Shaik got featured on the ASME website. A paper titled "Numerical investigation of aerospikes semi-cone angle and a small bump on the spike stem in reducing the aerodynamic drag and heating of spiked blunt-body: New correlations for drag and surface temperature" by Mr Veeresh Tekure under the supervision of Dr Venkata Subbiah has appeared in Physics of Fluids and selected as an editor's pick article. Dr Ranabir Dey's research on how self-propelling droplet microswimmers adapt to increasing viscosity in their surrounding by exhibiting a non-intuitive bimodal motility has appeared in Physical Review X. A paper titled "Experimental investigation of a nonspherical water droplet falling in air" by MAE PhD student.

Ms Meenu Agrawal, under the supervision of Dr Badarinath Karri, has been selected as an editor's pick article. IITH has signed a memorandum of understanding (MoU) with the ISRO Inertial System Unit (IISU) on January 13, 2022. As a part of this MoU, collaborative research will be done in the area of gyroscopes. Dr Chandrika Prakash Vyasarayani from the MAE department is involved in this work.

For more information, please visit: <https://mae.iith.ac.in/>



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Patents:

Filed:

1. Surya Kumar S, N Venkata Reddy; A Method for reduction of residual stresses in additive manufactured components through electropul; 202241020827.

Surya Kumar S; A novel area filling approach in metal additive manufacturing for reducing substrate distortion; 202241020913.

Surya Kumar S, N Venkata Reddy; Method and System Thereof to Fabricate Parts Using Metal Additive manufacturing and Double-Sided; 202241046376.

Publications:

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Funded Research Projects:

- Anurup Datta; Design and development of a setup for high throughput manufacturing of mesoscale metallic structures through laser beam shaping; 32.16 L. [SERB/MAE/F287/2022-23/G504].
- Ashok Kumar Pandey; Nonlocal Approach for Modeling Delamination in Composites; 40 L. [DRDO/CE/F050/2022-23/G469].
- Chandrika Prakash Vyasarayani; Design and Development of an Experimental Setup for Measurement of 10 Inertial Parameters of Slender Flights/Projectiles; 88.83 L. [ARB/MAE/F090/2022-23/G537].
- Gnanaprakash Kanagaraj; Characterization of fly ash from co-firing of coal/biomass blends in optimized swirl burner for utilization in cement-based materials; 116.11 L. [TPN/85552].
- Gnanaprakash Kanagaraj; Electrically controlled solid propellants for variable thrust generation in lab-scale reaction control system; 32.99 L. [SRG/2023/000700].
- Harish Nagaraj Dixit; Effect of Marangoni stresses and interfacial rheology on migration and deformation of surfactant-lad; 18.74 L. [CRG/2022/001947].
- Harish Nagaraj Dixit; On the role of inertia and surfactants in moving contact line flows; 54.03 L. [G446].
- Karri Badarinath; Establishing Hybrid hydrodynamic assisted with acoustic curitation water treatment facility for high

- quality drinking water; 10.05 L. [SERB/MAE/F129/2022-23/G511].
9. M Ramji; Modeling and design of an integration scheme of carbon fiber reinforced silicon carbide composite panels to the metallic bulkhead using suitable insulation and fasteners; 26.92 L. [CARS DRDO/MAE/F023/2022-23/S262].
 10. M Ramji; Dynamic Characterization of Tungsten and Aluminum Alloys; 40.96 L. [DRDO/MAE/F152/2022-23/G461].
 11. Mahesh M S; Investigation of Thermoacoustics of a Hydrogen Burner System; 6.16 L. [SBEST/MAE/F219/2022-23/S240].
 12. N Venkata Reddy; Circular Manufacturing Research and education collaboration with India and Japan-CIRMAN-322275 Funded: The Research Council of Norway (NOK 2000000); 164.15 L. [CIRMAN/MAE/F099/2022-23/S228].
 13. Niranjana Shrinivas Ghaisas; Boundary layer and wind farm flows over heterogeneous terrain: esign-oriented model development usi; 43 L. [CRG/2022/006735].
 14. Pankaj Sharadchandra Kolhe; Modelling and Performance Estimation of the Compressor Stage of a Micro-Gas Turbine; 6.16 L. [SBEST/MAE/F015/2022-23/S239].
 15. R Gangadharan; NULL; 0 L. [DRDO/MAE/F153/2022-23/G543].
 16. Raja Banerjee; The Experimental Investigation and Numerical Modelling of Heat Absorption Efficacy of Additive Enhanced Endothermic Rocket Fuels; 230.58 L. [DRDO/MAE/F219/2022-23/S253].
 17. Raja Banerjee; Param Seva HPC Facility - National Supercomputing Facility; 0 L. [C-DAC/MAE/F124/2022-23/G492].
 18. Raja Banerjee; Modelling and Performance Estimation of the Compressor Stage of a Micro-Gas Turbine; 6.16 L. [SBEST/MAE/F015/2022-23/S239].
 19. Raja Banerjee; Development of an on-board spray controller model for UAVs using AI for precision agricultural application; 34.12 L. [SERB/MAE/F015/2021-22/G436].
 20. Ranabir Dey; Effects of elasto-hydrodynamic stimuli on active droplet microswimmers in soft fluidic confinements; 33.04 L. [G423].
 21. Safvan Palathingal; Design and Development of an Experimental Setup for Measurement of 10 Inertial Parameters of Slender Flights/ Projectiles; 88.83 L. [ARB/MAE/F090/2022-23/G537].
 22. Sai Sidhardh; Modeling and design of an integration scheme of carbon fiber reinforced silicon carbide composite panels to the metallic bulkhead using suitable insulation and fasteners; 26.92 L. [CARS DRDO/MAE/F023/2022-23/S262].
 23. Sai Sidhardh; Soft LS Dyna ANN Material Model IITH; 7.5 L. [HONEYWELL/MAE/F268/2022-23/S215].
 24. Sai Sidhardh; Fractional calculus framework for damage and fracture: modelling progressive damage using nonlocal theories and data-driven constitutive laws; 25.13 L. [SERB/MAE/F268/2022-23/G503].
 25. Saravanan Balusamy; Design and development of a fuel-flexible burner for domestic and community cooking applications; 24.93 L. [PCRA/MAE/F151/2022-23/G477].
 26. Sayak Banerjee; The Experimental Investigation and Numerical Modelling of Heat Absorption Efficacy of Additive Enhanced Endothermic Rocket Fuels; 230.58 L. [DRDO/MAE/F219/2022-23/S253].
 27. Sayak Banerjee; Investigation of Thermoacoustics of a Hydrogen Burner System; 6.16 L. [SBEST/MAE/F219/2022-23/S240].
 28. Syed Nizamuddin Khaderi; Dynamic Characterization of Tungsten and Aluminum Alloys; 40.96 L. [DRDO/MAE/F152/2022-23/G461].
 29. Venkatesham Balide; Overall Noise Estimation of On-Board Power plant equipment; 9.95 L. [BHEL/MAE/F057/2022-23/S242].
 30. Vinayak Eswaran; Development of a Hybrid RANS-LES Solver based on Kolmogorov's Hypothesis for Separated Flows; 29.84 L. [G367].
 31. Viswanath R R S R Chinthapenta; Corneal Characterization under biaxial-loading in physiological conditions; 24.05 L. [SERB/MAE/F117/2022-23/G547].
 32. Viswanath R R S R Chinthapenta; Study of Constitutive Modeling of Graphite for Thermal and Pressure loads; 11.74 L. [RCI DRDL/MAE/F117/2022-23/S251].

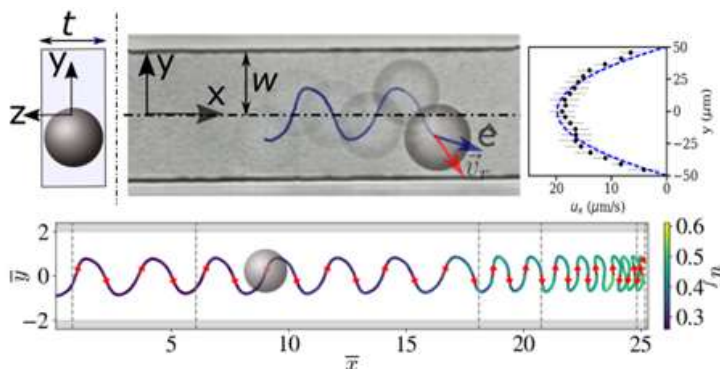
Awards and Recognitions:

1. Chandra Prakash Vyasarayani received the International Conference on Multiscale Materials Modelling Travel Award, 2022.
2. Chandrika Prakash Vyasarayani has been the Associate Editor of ASME journal of mechanisms and robotics.
3. Naveen N Kethavath, student of Niranjana Shrinivas Ghaisas won the Best Oral Presentation Award in ICFTES Conference, NIT Calicut.
4. Kingshuk Mondal, MTech (RA) student of Niranjana Shrinivas Ghaisas received "Appreciation in Research" award from IIT Hyderabad at the 15th Foundation Day, 2023.
5. Jaykumar Patel, PhD student of Niranjana Shrinivas Ghaisas has been awarded PMRF in the year 2022.
6. Vinayak Eswaran received the Teaching Excellence award, IIT Hyderabad.
7. Isha Paliwal, PhD student of M Ramji, has been awarded ISAMPE award for Smart Materials & systems, Technology Development (Student Category) -2022.
8. Safvan Palathingal received the Best Paper award at the SICE, IIT Hyderabad, India.
9. Harish Nagaraj Dixit received the Teaching Excellence Award.

Research Highlights:

1. Oscillatory rheotaxis of artificial swimmers in microchannels – Dr Ranabir Dey:

In this work, we show that a self-propelled active droplet (a type of artificial microswimmer) navigates upstream of an external flow in a microchannel in an oscillatory trajectory, reminiscent of many biological microswimmers like bacteria. Comparing our experiments to a hydrodynamic theoretical model, we explain that the oscillatory upstream swimming of the spherical droplet is governed by the interaction of the finite-sized microswimmer with the microchannel walls and the shear flow characteristics. Our results provide a realistic understanding of the behaviour of active particles navigating in confined microflows relevant to many biotechnology applications.



Oscillatory rheotaxis of artificial swimmers in microchannels

Video link: <https://www.youtube.com/watch?v=LNeOyIOrQ80>

Publication: R. Dey †, C. M. Bunes, B. V. Hokmabad, C. Jin, C. C. Maass †, “Oscillatory rheotaxis of artificial swimmers in microchannels”, *Nature Communications*, 13 (1), 1-10, 2022 (Selected as Editor’s highlight under Applied Physics and Mathematics). († corresponding authors)4

2. Tajima Tailored Fiber Placement Machine:

Tailored Fibre placement (TFP) is an advanced composite preform manufacturing technique based on the principle of embroidery for continuous placement of fibrous material along load paths in composite structures. The infiltration of TFP-preforms can be done with conventional processing techniques such as resin transfer moulding, vacuum bag moulding, pressing and autoclave moulding. Tajima TFP machine enables precise continuous fixation of fibres, wires, tubes, and roving in 0°-359° direction. Hence, it can be used to generate complex shapes and performs up to 1200 mm×1000 mm

area can be stitched. Moreover, multiple layers of different fibres can be stitched together.

Salient features:

- It can produce preforms with the desired shape, size, and fibre orientations, which leads to less material wastage.
- It can be useful for the fabrication of composite structures where stiffness can be varied along the plane, which is not possible with conventional composites.
- Different fibres can be stitched to create hybrid structures.
- This machine is capable of stitching wires as per the given drawings, which can be useful for smart structures.
- It can be used to make precise and complex parts for prosthetics, robotic applications and complex composite parts of aerospace structures.



Tajima Tailored Fiber Placement Machine

Department of Physics

The Department of Physics at IITH continues to stride forward in its path of excellence in research and education by performing ground-breaking research, implementing novel instructional methodologies, and designing new programs/courses joining hands with other departments and our partners in the industry. FY 22-23 has been an epochal year for the department when it jumped 100 points in QS World Rankings by Subject-2023 for Physics & Astronomy and ranked at 501-550 in the world.

In FY 22-23, the department launched a brand new MSc program in Medical Physics and an MTech program in Ophthalmic Engineering. The department has excellent faculties in five major research areas (condensed matter physics experiment, condensed matter theory, high energy physics, astrophysics, optics, quantum information, computation, and communications). Apart from the core teaching of the department, four of our faculties are involved in MTech (ISS) and one in MTech (EST). At present, the department has a total of 28 faculty members and 267 students (PhD, MSc, BTech Engineering Physics, MSc in Medical Physics, MTech in Ophthalmic Engineering). FY 22 – 23 has been a fruitful year in terms of research and student achievements. Faculties of our department have published nearly 274 international journal articles and delivered numerous talks at various conferences/workshops.

The Department established the Advanced Dark Sky Observatory (ADSO), a unique accomplishment among all MoE institutes (IITs, IISERs, and IISc). This is another impressive addition to the list of major cutting-edge research facilities set up in the department, such as XRD, VSM (FIST supported), MOKE, AFM, SQUID, Femtosecond Laser, etc., for in-house research as well as for supporting external users. Our faculties have built a departmental HPC facility with 384 computing cores and are also planning to expand it further.

Several members of our faculty were elected to prestigious scientific professional societies and science academies. Several members of the faculty were also inducted into the editorial boards of prestigious international journals such as the Editorial Board of Electronic Structure (Institute of Physics), Editorial Board of Frontier in Physics (AMO), and the Indian Journal of Physics and elevated to high ranks in technical professional organizations such as the IEEE. In addition, two of our faculty members are also involved in the Belle and Belle II experiment, and another faculty member is involved with the Compact Muon Solenoid (CMS) experiment at the CERN Large Hadron Collider (LHC). We are also part of the Dark Energy Survey and the Indian Pulsar Timing Array Consortium. Our faculties continue to establish various National and International collaborations and are actively involved in joint programs, such as GIAN, SPARC, and international bilateral research programs. Students of the department continue getting placed at various eminent National and International Universities/ Research Laboratories to pursue their higher studies. Our students obtained various international-level fellowships, such as the Marie Curie Postdoc fellowships, NIMS-ICGP fellowship, etc.

Physics faculties are actively involved in obtaining sponsored projects from DST, SERB, STARS, DRDO, Sree Padmavathi Venkateswara Foundation, IISc Bangalore, and many other funding agencies during FY 22 – 23, which is worth 287.81 L. The Department welcomes four new members of the faculty: Dr Alok Kumar Pan, Dr Archak Purkayastha, Dr Saranya Ghosh, and Dr Yogesh Kumar Srivastava. Dr Pan's research interests are in Quantum Information theory, Quantum Communications, Quantum foundations, Quantum Cryptography, and Quantum Metrology. Dr Purkayastha's research focuses on on-equilibrium quantum statistical physics, specifically in the theory of driven dissipative quantum many-body systems, having strong overlaps with quantum condensed matter, chemistry, information, and thermodynamics. Dr Ghosh specializes in Experimental high-energy physics, particularly on topics such as Higgs physics and the search for new physics beyond the Standard Model of particle physics. Dr Srivastava's expertise is in Terahertz spectroscopy, active/passive metamaterials, ultrafast quantum photonic devices, superconductors, and spintronics.

For more information, please visit: <https://physics.iith.ac.in/>

Faculty

Head of the Department



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Patents:

Published:

1. Vandana Sharma; Reconfigurable Unmanned Aerial Vehicle (UAV) within flight adaptive multimotor and method thereof; 202141027004.
2. Arabinda Haldar; Reconfigurable Logic Via Gate Controlled Skyrmion Motion; 202141057701.
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Funded Research Projects:

1. Alok Kumar Pan; Device-independent quantum randomness certification using non-projective measurements; 6 L. [SERB/PHY/F321/2022-23/G548].
2. Alok Kumar Pan; Probing multipartite non-local correlations in various quantum network configurations and randomness certification; 19 L. [SERB/PHY/F321/2022-23/G551].
3. Anjan Kumar Giri; Indian institutions Fermilab collaboration in Neutrino Physics; 175 L. [G-218].

4. Anupam Gupta; Collective behaviour in turbulent environment; 15 L. [DST/NSM/R&D_HPC_Applications/2021/05].
5. Anupam Gupta; Mathematical modeling of tissue morphogenesis with viscoelastic extracellular matrix; 6.6 L. [SERB/PHY/F244/2022-23/G527].
6. Arabinda Haldar; Harnessing Pure Spin Current by Tailoring molecular spininterface; 30.04 L. [BRNS/MSME/F206/2022-23/G472].
7. Arabinda Haldar; Spintronics based Digital Logic Architecture Design for AI Applications; 60 L. [SERB/EE/F091/2022-23/G546].
8. Arabinda Haldar; Spin wave dispersions and nanoscale imaging of magnons using Brillouin light scattering spectro-microscopy; 42.19 L. [SERB-CRG/PHY/F182/2022-23/G540].
9. Bhuvanesh Ramakrishna; Laser driven ion sources for cancer therapy; 80 L. [G255].
10. Bhuvanesh Ramakrishna; Laser driven ion sources for cancer therapy; 80 L. [G255].
11. Jyoti Ranjan Mohanty; Magnetization Dynamics in Ferrimagnetic Heterostructure with Domain Wall Junctions; 0.04 L. [IEEE/PHY/F103/2022-23/S245].
12. Mahesh Peddigari; Composite-engineered lead-free ceramic thick films for high energy storage density capacitor applications; 25 L. [SG/IITH/F298/2022-23/SG-157].
13. Nithyanandan Kanagaraj; Design and Development of a multifunctional all-fiber laser system for The "On-demand" generation of structured laser light (DENTO); 20 L. [AC2023-5].
14. Priyotosh Bandyopadhyay; Understanding Higher Guage Symmetrics at the LHC; 2.2 L. [G327].
15. Priyotosh Bandyopadhyay; Data and Machine learning at the LHC; 5 L. [AV/KAR/2022/0167].
16. Raavi Sai Santosh Kumar; Charge transfer dynamics in non-fullerene small molecule organic solar cell; 61.21 L. [G318].
17. Saurabh Sandilya; Measurements related to Rare B-decays (and to set-up a High Energy Physics photo-detector laboratory); 24.12 L. [SERB/PHY/F245/2022-23/G517].
18. Shantanu Desai; Explorations in Astrophysical Data Mining, Astrostatistics and Astroinformatics; 44 L. [G207].
19. Shinde Satish Laxman; Investigating the optically excited hot carrier in transition metal nitrides for energy application; 25 L. [SG/IITH/F300/2022-23/SG-20. 158].
20. Priyotosh Bandyopadhyay; Understanding Higher Guage Symmetrics at the LHC; 22.2222358; [G327].
21. Priyotosh Bandyopadhyay; Data and Machine learning at the LHC; 522.2222; [AV/KAR/2022/0167].
22. Alok Kumar Pan; Device-independent quantum randomness certification using non-projective measurements; 689; [SERB/PHY/F321/2022-23/G548].
23. Dr Alok Kumar Pan; Probing multipartite non-local correlations in various quantum network configurations and randomness certification; 196; [SERB/PHY/F321/2022-23/G551].

Awards & Recognitions:

1. Arabinda Haldar has been elected as "Early Career Editorial Board" member for Materials Today Electronics (Elsevier) journal, 2022.
2. Arabinda Haldar has been the Session Chair for ICONN 2023, SRM Institute of Science and Technology, Chennai, 2023.
3. Arabinda Haldar has been the "Review Editor" on the Editorial Board of Quantum Materials (specialty section of Frontiers in Materials), 2022.
4. Arabinda Haldar "Review Editor" on the Editorial Board of Quantum Materials (specialty section of Frontiers in Materials), 2022.
5. Bhuvanesh Ramakrishna has been elevated to the rank of Senior Member of IEEE this year.
6. Mayukh Pahari has been elected as the Honored Life Member of the Astronomical Society of India.
7. Nithyanandan Kanagaraj has been elected as Vice-Chair of the OSA Technical Group "Lasers in Manufacturing".
8. Nithyanandan Kanagaraj has been elected as Events Officer of the OSA Technical Group "Ultrafast Phenomena".
9. Nithyanandan Kanagaraj has been Elevated to OSA Senior Member.
10. Priyotosh Bandyopadhyay received the Teacher Excellence Award IITH 2023.
11. Priyotosh Bandyopadhyay received DST-Karyashala, INR 5lakhs for the Data and Machine learning at the

LHC, IIT Hyderabad, India

12. Priyotosh Bandyopadhyay has been the Visiting Professor at the Korea Institute for Advanced Study, South Korea, for the summer of 2023 with an International travel grant.
13. Raavi Sai Santosh Kumar has been selected for membership in the Indian National Young Academy of Science (INIAS) (2022-2026).
14. Raavi Sai Santosh Kumar received the Visiting Researcher Fellowship at the National Institute of Materials Science (NIMS), Tsukuba, Japan.
15. Saket Asthana's PhD Student, Dr Krishnarjun Banerjee (PhD - 2022), received the Prestigious Marie Curie Postdoctoral Position from the Queen Mary University of London
16. Shantanu Desai has been inducted into the Stanford top 2% scientists for 2022.
17. Suryanarayana Jammalamadaka's PhD student, Mr Prince Kumar, received the PMRF Fellowship.
18. Yogesh Kumar Srivastava received the NTU Open Research Award 2022.

Highlights:

1. Seminars/Workshops conducted

- The Department of Physics organized the National Science Day on 28th Feb 2023 to commemorate the first Indian Nobel Laureate CV Raman's contribution to Science. Dr Radhakrishnan, former Chairman of ISRO, was the Guest of Honor and delivered a special lecture titled "Trsyt with an Amazing ISRO and my Life Lessons."
- Indo-UK Workshop on Translating Laboratory Astrophysics to Instrumentation for Human Assistance: organized by Dr Vandana Sharma.
- Karyashala (SERB) on "Data and Machine Learning at the LHC". Priyotosh organised during 21-28/08/22. Around 50 students, including 5 experts attended the workshop.
- The Physics Department initiated the monthly student seminar and student meeting series in January 2023 on the final Wednesday of each month. The series has been successful so far, leading to further interaction among the students and between the students and the faculty.
- The third edition of the international workshop series on "Quantum Information in QFT and AdS/CFT" was held in hybrid mode for three days, 16-18th Sept. 2022.
- We have organized many seminars in astrophysics/high energy nuclear physics over the last year. This list can be found at <https://physics.iith.ac.in/HEP/video.html>.
- Soft and Active Matter Seminar Series cycle II, from May 2022- April 2023.

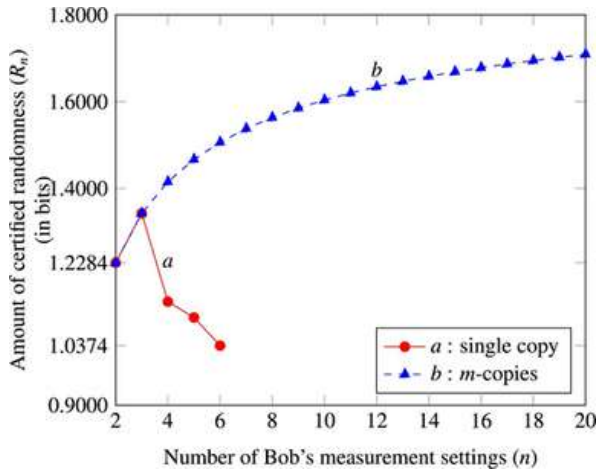
2. New Infrastructure/Labs set up:

Advanced Darksky Observatory (ADO) is established. The first in-campus research observatory among all IITs aims to provide cutting-edge astronomy and engineering research. It hosts a 0.5meter Robotic optical telescope (largest among small telescope categories) with a magnification of ~1000x and capable of resolving a structure as small as 25 km on the surface of the moon, individual rings of Saturn.

Research Highlights:

3. Device-independent randomness certification using multiple copies of entangled states – Dr Alok Kumar Pan

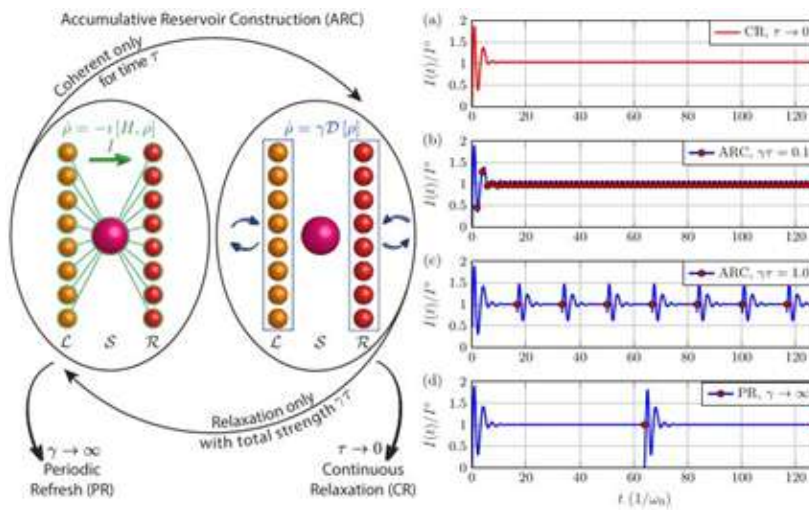
Our research group is focused on exploring various state-of-the-art aspects of quantum foundations, quantum secure communication, quantum sensing, and quantum information theory. Currently, we are actively working on the following research topics: the device-independent and semi-device-independent self-testing of quantum instruments, quantum contextuality and nonlocality, quantum network, weak measurement-based quantum sensing, joint measurability, classicality, and negativity of quasiprobability, the quantum advantage in communication complexity games, device-independent quantum cryptography, information-theoretic advantage of the indefinite causal order of quantum channels, etc. We remain open to including more topics on students' demand. In recent years, we have published quite a significant number of research articles in high-visibility journals on the above-mentioned topics. A complete list of publications can be found at this url: https://scholar.google.co.in/citations?hl=en&user=65c_QkIAAAA&view_op=list_works&sortby=pubdate. Citation of below work: Mahato, S. S., & Pan, A. (2022). Device-independent randomness certification using multiple copies of entangled states. *Physics Letters A*, 456, 128534. <https://doi.org/10.1016/j.physleta.2022.128534>



corresponding to the optimal quantum Bell violation with different measurement settings of Bob. In particular, the red curve 'a' shows the amount of randomness for different n when a single copy of a maximally entangled two-qubit state is shared between Alice and Bob. It is found that the amount of randomness decreases with the increase of the number of measurement settings n . On the other hand, if $m = \lfloor n/2 \rfloor$ copies of bipartite maximally entangled state are shared between Alice and Bob, then the amount of randomness increases with the increase of n as shown by the dashed blue curve 'b'. Thus, $\lfloor n/2 \rfloor$ copies of the bipartite maximally entangled state provide an advantage over a single copy in the quantification of certified randomness. [For interpretation of the colours in the figure(s), the reader is referred to the web version of this article.]

4. The Accumulative Reservoir Computation method to calculate dynamics of dissipative quantum systems - Dr Archak Purkayastha

We focus on exploring the physics of driven dissipative quantum many-body systems. Over the last year, we have formulated two classes of analytical and numerical techniques to simulate the dynamics of such systems (Refs [1], [2] given below). We have further taken steps towards formulating the theory for describing the thermodynamics of such systems and have discovered the possibility of new types of far-from-equilibrium quantum thermal machines (Ref. [3] given below).



The Accumulative Reservoir Computation method to calculate dynamics of dissipative quantum systems (taken from Ref. [2])

Ref. [1] Lyapunov equation in open quantum systems and non-Hermitian physics, Archak Purkayastha, Phys. Rev. A 105 (6), 062204 (2022).

<https://doi.org/10.1103/PhysRevA.105.062204>

Ref. [2] Accumulative reservoir construction: Bridging continuously relaxed and periodically refreshed extended reservoirs, Gabriela Wójtowicz, Archak Purkayastha, Michael Zwolak, and Marek M. Rams, Phys. Rev. B 107, 035150 (2023).

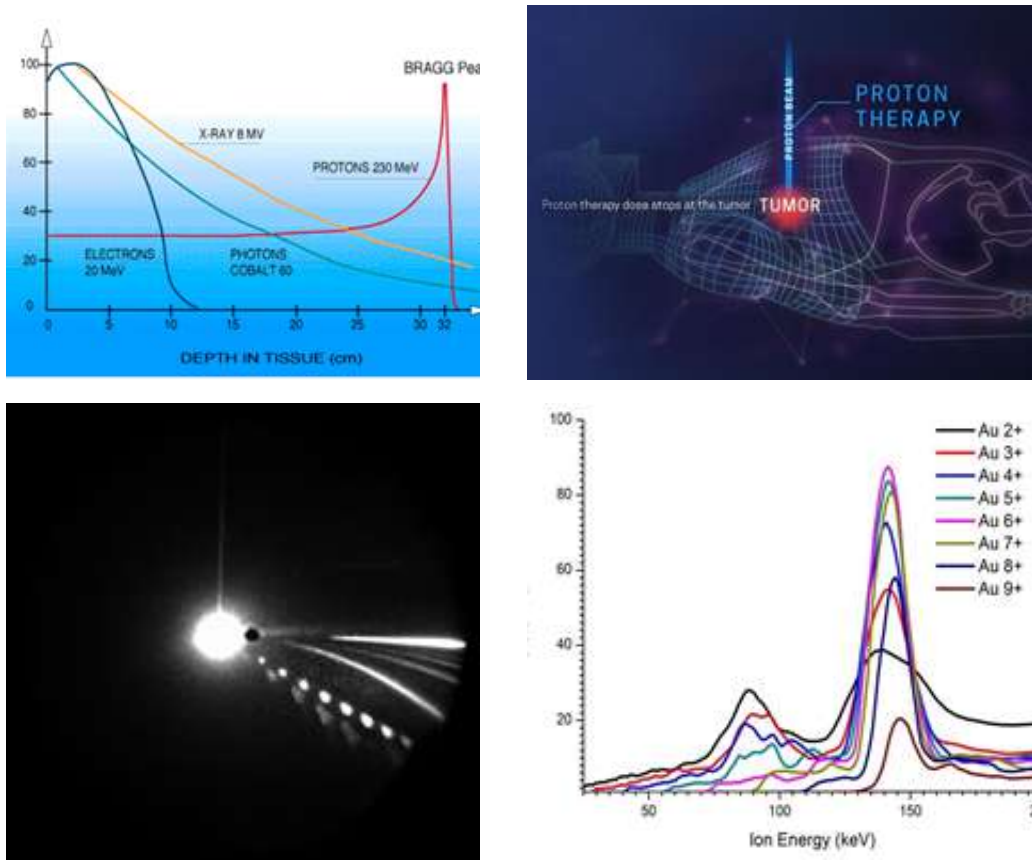
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Ref. [3] Periodically refreshed quantum thermal machines, Archak Purkayastha, Giacomo Guarnieri, Steve Campbell, Javier Prior6, John Gould, Quantum 6, 801, (2022). <https://doi.org/10.22331/q-2022-09-08-801>.

5. Acceleration of gold ions to 100 KeV from a Tabletop Laser - Dr Bhuvanesh Ramakrishna

The interaction of intense laser pulses with matter is opening up new frontiers in physics via the production of extreme pressures, temperatures and intense electric and magnetic fields. This has led to the use of high-power laser radiation for exploring the properties of hot dense matter, the production of high-energy particles and radiation and the development of schemes for "tabletop ion acceleration". These advances are driven by rapid developments in ultrashort pulse laser technology, which have enabled new regimes in laser power and intensity to be reached. Laser-driven compact ion therapy is to investigate the usefulness of employing laser-driven ion beams f

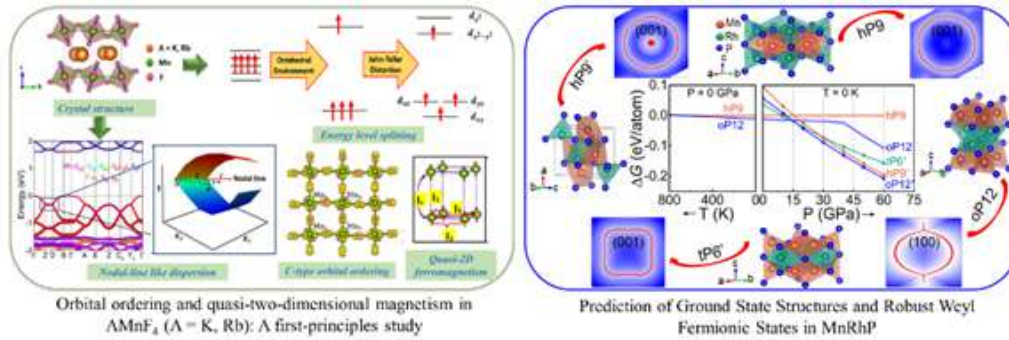
for “cancer therapy. This would provide possibilities of better dose conformity to the treatment target when compared to commonly used photon or electron beams. Proton beams have low entrance dose, sharp penumbra, rapid fall off at the distal edge of the dose distribution, and the maximum rate of energy loss at the end of the range, i.e. the Bragg peak effect.



Recent Results: Acceleration of gold ions to 100 KeV from a Table-top Laser

6. Computational Condensed Matter Physics - Prof Kanchana V

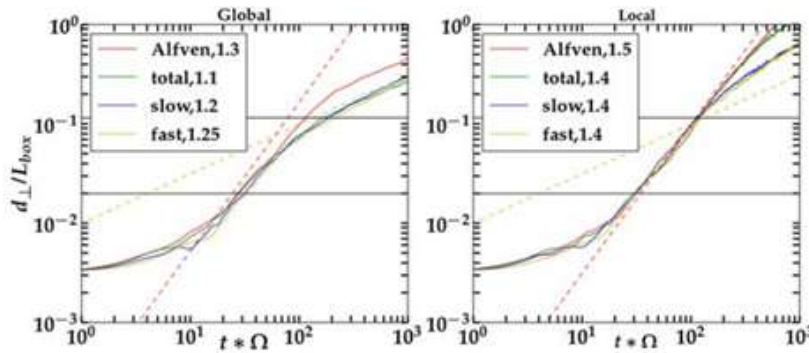
Our group mainly focuses on unravelling the complexities of crystalline materials and predicting their diverse thermal, electronic, magnetic, and topological properties through first-principles calculations. Energy harvesting has emerged as a focal point for our group, particularly in the domain of thermoelectric materials. In search of promising thermoelectric materials, we found CsAgO to be a promising candidate, boasting a remarkable figure of merit. Furthermore, investigations into n-type LaAgTeO have revealed exceptional thermoelectric performance, surpassing that of other oxide materials, while exhibiting an unprecedentedly low lattice thermal conductivity. [Physical Review Materials, 7(2), 025405 (2023); Journal of Physics: Condensed Matter, 34(29), 295502 (2022)]. The investigation of electronic structure, precisely the topological characteristics of diverse types of quantum materials, is also the current area of concentration, like Heusler compounds for their transport properties, hexagonal 111-type topological materials, perovskite-like structures, etc. [Journal of Magnetism and Magnetic Materials, 562, 169766 (2022); Computational Materials Science, 213, 111625 (2022)]. The electronic band structure calculations of rare-earth-based compound GdAgGe reveal that it has a nodal line with drumhead surface states coupled with a nonzero Berry phase, making it a nontrivial nodal-line semimetal [Physical Review B, 107(8), 085137 (2023)]. Topological features have been discovered in materials in electronic or phononic bands, but seldom in both for a compound such as the ZGeSb (Z=Hf, Ti, and Zr) class of compounds, which is quite uncommon in materials [Journal of Physics: Condensed Matter, 34(44), 445502 (2022)]. Topological metals and semimetals have received a lot of attention recently due to their unusual properties both under normal and high pressure, although they have not been extensively studied. One such compound with non-trivial topological properties robust to high pressure is MnRhP [The Journal of Physical Chemistry C, 126(40), 17328-37 (2022)]. Aul has uncovered a movable Dirac point with hourglass band dispersion, remaining steadfast even amidst the transformative amorphization induced by high pressure [Journal of Alloys and Compounds, 928, 167178 (2022)]. We have also shed light on orbital ordering and quasi-two-dimensional magnetism in AMnF4 compounds (A = K, Rb), which revealed quasi-two-dimensional ferromagnetic behaviour, nodal-line-like dispersions, and staggered orbital ordering phenomena, paving the way for further exploration [Physical Review B, 06(2), 024409 (2022)]. The diversity of available materials is greatly expanded by their unique features, allowing for more extensive investigations of their structure-property relationships and opening new possibilities for developing device applications.



Computational Condensed Matter Physics

7. Cosmic-ray Transport in Magnetohydrodynamic Turbulence – Dr Kirit Makwana

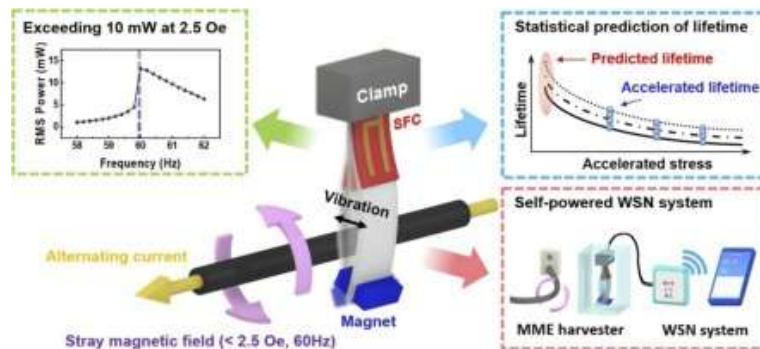
Our group conducts research to understand basic phenomena in space, astrophysical, and laboratory plasmas. We use theoretical and computational techniques to understand turbulence and magnetic reconnection in solar and astrophysical plasmas. Recently, we have been able to perform novel and very precise simulations of kinetic Alfvén waves in solar wind plasma, which show that these wave modes have the potential to explain the observed sub-ion range solar wind turbulence. We were also able to demonstrate the phenomenon of super-diffusion of particles in magnetohydrodynamic turbulence in our simulations [Cosmic-ray Transport in Magnetohydrodynamic Turbulence, *Astrophys. J.* 926, 94].



Cosmic-ray Transport in Magnetohydrodynamic Turbulence

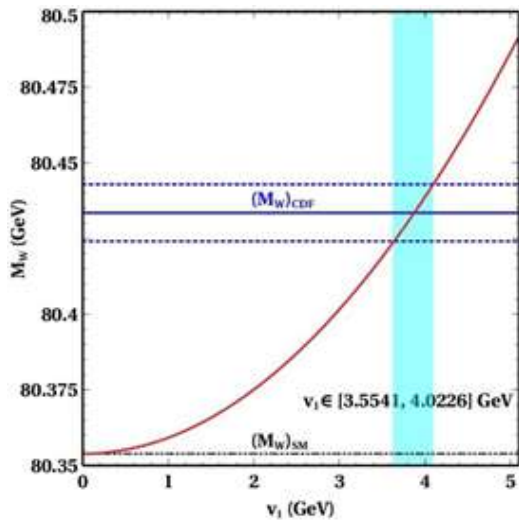
8. Boosting the lifespan of magneto-mechano-electric generator via vertical installation for sustainable powering of Internet of Things sensor – Dr Mahesh Peddigari

Our research group primarily focuses on the processing and development of highly dense dielectric ceramic thin/thick films for energy storage/electrocaloric/piezoelectric applications. We also focus on designing and developing piezoelectric and magnetoelectric composites for sensing and energy-harvesting applications. In the last year, we proposed a novel approach to simultaneously enhance the output power efficiency and lifetime of the magneto-mechano-electric (MME) generators for powering self-powered WSNs utilizing the second harmonic vibration mode of the cantilever and vertical installation, which was published in *Nano Energy*, 101, 107567 (2022). We also explored the hardener-type dopant effect on the energy generation performance of the PMN-PZT based MME generators (*J. Mater. Chem. A*, 11, 3364 (2023)). (*Nano Energy*, 101, 107567 (2022), <https://doi.org/10.1016/j.nanoen.2022.107567>)



Magneto-mechano-electric generators for self-powered wireless sensor network applications

9. Type II Dirac seesaw with observable ΔN_{eff} in the light of W-mass anomaly – Prof Narendra Sahu

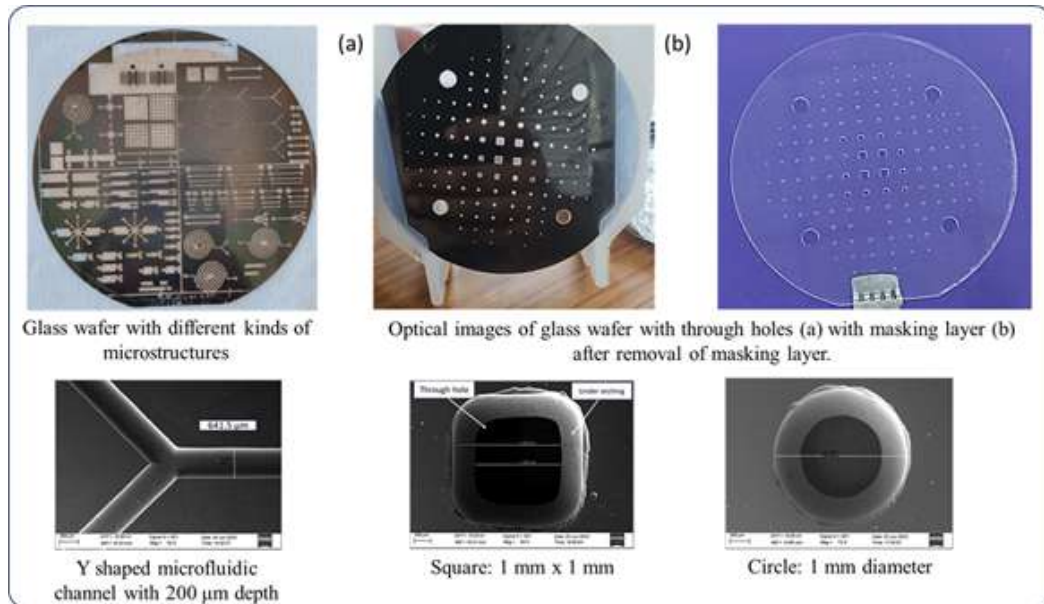


Type II Dirac seesaw with observable ΔN_{eff} in the light of W-mass anomaly

In the last year, our group, in collaboration with Prof. R.N. Mohapatra from Maryland University, has proposed a gauged $U(1)_{L_e-L_\mu-L_\tau}$ symmetry which predicts a 4th sequential generation of chiral fermions (leptons and quarks) which are yet to be discovered at the collider. In this scenario, the breaking of $U(1)_{L_e-L_\mu-L_\tau}$ gauge symmetry is responsible for neutrino mass via type-I seesaw mechanism, while the real part of $U(1)_{L_e-L_\mu-L_\tau}$ symmetry breaking scalar field (say ϕ) plays the role of dark matter. Since ϕ is unstable, for it to qualify as a dark matter, its lifetime must be larger than the age of the Universe, implying that the mass of ϕ must be less than 1 MeV. This result is published in Phys. Lett B 843 (2023) 138001. Our group also devised a couple of models to explain the W-mass anomaly reported by CDF-II collaboration with their updated measurement. The CDF collaboration reported that the new measurement of W-boson mass is found to be $M_W = (80433.5 \pm 9.4) \text{ MeV}$ using the data corresponding to 8.8 fb^{-1} integrated luminosity collected at CDF-II detector of the Fermilab Tevatron collider. This newly measured value has a 7σ deviation from the standard model expectation ($M_W = 80357 \pm 6 \text{ MeV}$). We show that if the Standard Model is extended with a hypercharge zero scalar triplet, then its vacuum expectation value ($v_1 = 3.79 \text{ GeV}$) can explain the CDF-II measured W-boson mass (as shown in the figure below) without affecting the Z-boson mass. This result is published in Phys. Lett B 833 (2022), 137297.

10. Wet bulk micromachining characteristics of Si{110} in NaOH-based solution - Prof Prem Pal

We in the MEMS and Micro/Nano Systems Laboratory perform both basic and applied research in MEMS and Micro/Nanosystems. Our research work focuses on MEMS processes, Silicon and Glass micromachining, the Study of thin films for MEMS, Surface texturing for solar cell applications, etc. Glass wet bulk micromachining is focused on fabricating through holes and deep cavities/grooves in 4-inch diameter glass wafer.

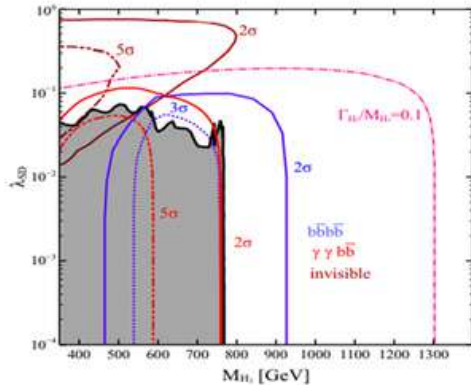


Wet bulk micromachining characteristics of Si{110} in NaOH-based solution

11. Secluded dark matter in gauged B – L model – Dr Priyotosh Bandyopadhyay

We mainly focused on probing beyond Standard Model scenarios at LHC and future colliders. Various exotic decay modes leading to displaced signatures are predicted and simulated. In this context, various seesaw scenarios are studied in (Eur.Phys.J.C 82 (2022) 3, 230, JHEP 02 (2023) 103). Leptoquarks, which are proposed in many unified theories, can explain some anomalies. However, they have been elusive in collider experiments. We proposed single Leptoquark production at the LHC and muon collider (Eur.Phys.J.C 82 (2022) 10, 916). Leptoquarks can generate Majorana neutrino mass at one-loop; such scenarios are looked for in Phys.

Rev.D106 (2022) 9, 095040. In another context, fermionic semi-annihilating dark matter is searched via indirect experiment for the first time (Phys. Rev.D 107 (2023) 1, 015020). In the context of the B-L scenario, another exotic scenario is both studied in the context of different dark matter data as well as collider search modes are proposed (JHEP 05 (2022) 182). Finally, the study of first-order phase transition and gravitational waves in inert singlet and triplet models is looked into (Phys. Rev.D 107 (2023) 5, 055032).

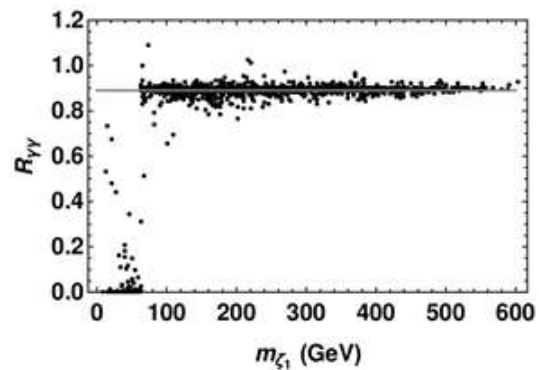


HL-LHC prediction for $pp \rightarrow H_2 jj \rightarrow jj + MET$, $pp \rightarrow H_2 \rightarrow H_1 H_1 \rightarrow 2b + 2\gamma$ and $pp \rightarrow H_2 \rightarrow H_1 H_1 \rightarrow 4b$ indicated by brown, red and blue color contours in $M_{H_2} - \lambda_{SD}$ plane. The black-shaded region is ruled out from the ATLAS search for $H_2 \rightarrow ZZ$

12. Global minimum and Higgs to diphoton decay - Dr Raghavendra Srikanth Hundi

Our focus is on studies beyond the standard model in the area of particle physics. In the last year, we have worked on the global minimum of the Dirac scotogenic model, where there can exist multiple minima, but the model prefers one of them to be the global minimum. We have shown that the desired minimum of the model can be the global minimum, apart from addressing other phenomenological quantities on Higgs to diphoton decay and dark matter (Phys. Rev. D 108 (2023) 1, 015006).

Also, we have been working on lepton flavour violation, which involves computing branching ratios of 2- and 3-body lepton decays and also the conversion rate of mu to e.

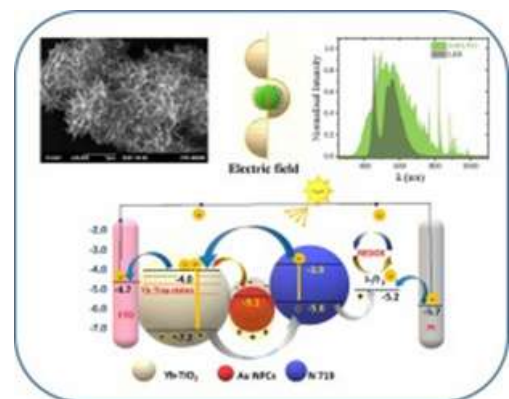


13. Plasmonic Au NPs embedded Ytterbium-doped TiO2 nanocomposites photoanodes for efficient indoor photovoltaic devices - Dr Sai Santosh Kumar Raavi

Our group works in advanced transient optical spectroscopy for various functional materials characterisation and provides critical inputs to aid in the fabrication and optimisation of devices using these materials. To this end, they employ a plethora of techniques encompassing femtosecond transient absorption spectroscopy, steady-state and time-resolved photoluminescence spectroscopy with TCSPC, cw-photoinduced absorption Spectroscopy, Transient Photocurrent spectroscopy, etc. In addition to these, we also fabricate DSSC and QDSC solar cell devices and develop interlayers like doped TiO2 for efficient interfaces. The group also contributes to the ultrafast nonlinear optical characterization of the various molecular systems.

Innovation in the field of Solar Cells:

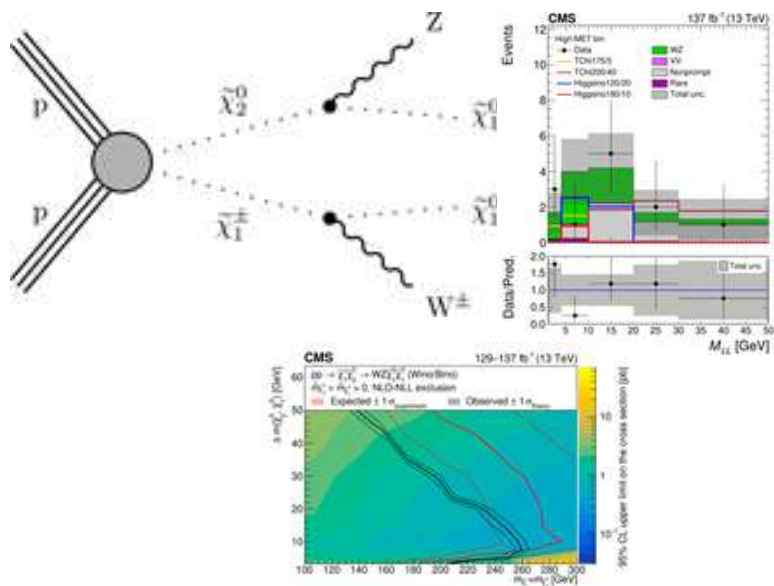
- Developed integrated thermally evaporated organic Solar cell module with 56 cells integrated into 5 cm x 2 cm ITO substrate. A patent application is already filed.
- Developed efficient photoanodes for eco-friendly and economical indoor photovoltaic devices and achieved best >13.8% for indoor PV. Additionally, the same photoanodes were used for efficient water-splitting devices.



Plasmonic Au NPs embedded Ytterbium-doped TiO2 nanocomposites photoanodes for efficient indoor photovoltaic devices.

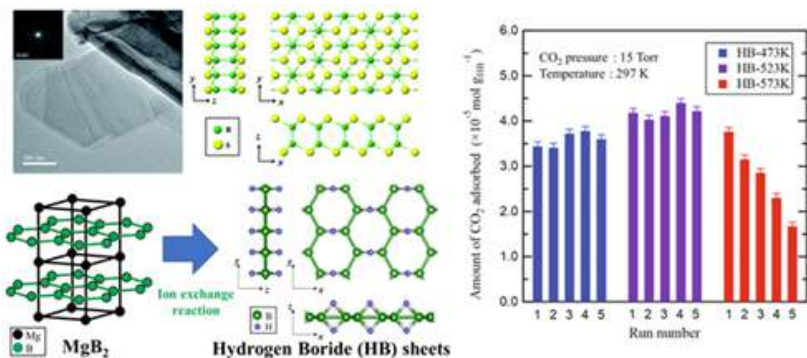
14. Experimental High Energy Physics research at the Large Hadron Collider and particle detector R&D – Dr Saranya Ghosh

Our group works on experimental high energy physics, particularly on the search for new particles, Dark Matter, studies of the Higgs boson and particle detector R&D. The group is focusing on physics at the Large Hadron Collider (LHC) using the data collected by the Compact Muon Solenoid (CMS) experiment. We are working towards having IITH become an independent member of the CMS collaboration, and towards that goal, we have applied and been accepted into the India-CMS collaboration, which is the collaboration of Indian institutes that are a part of the CMS experiment that is a major step toward being accepted into the CMS collaboration and our group can work on the CMS experiment data in collaboration with other Indian groups. This will also make IITH eligible for funding from the Indian government agencies (DAE and DST) for work on the CMS experiment as an independent member. Following administrative steps towards joining the CMS collaboration are ongoing. Further, a particle detector development laboratory is in the process of being set up at IITH with certain equipment acquired and more equipment in the process of getting acquired. In parallel, research work is ongoing on the search for beyond Standard Model physics using the data collected at the CMS experiment inspired by supersymmetry models and on searches for Dark Matter candidates at the LHC. While the studies are still ongoing, the work is an extension of a previous analysis that was published in 2022: J. High Energy Phys. 2022, 91 (2022).



15. 2D boron monosulfide (BS) nanosheets and Hydrogen boride (HB) nanosheets for hydrogen generation and CO2 conversion - Dr Satish Laxman Shinde

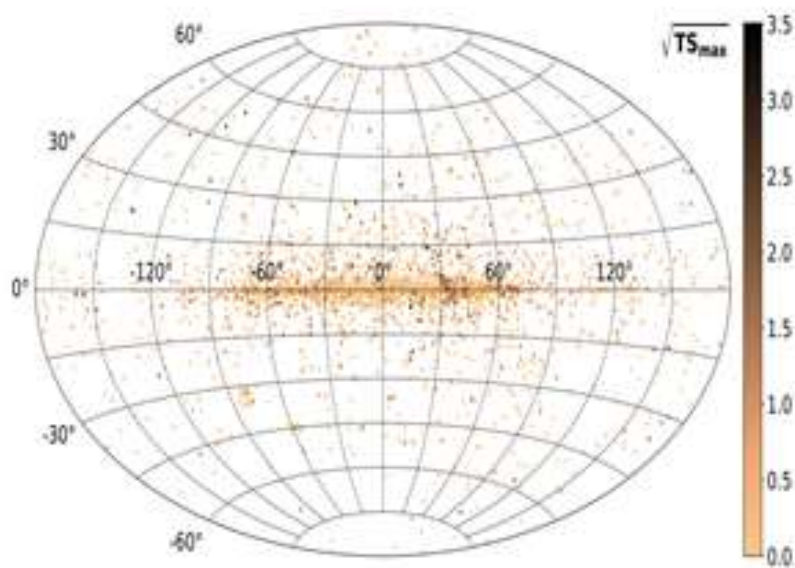
Our group mainly work in the field of nano-/quantum- photonics, plasmonics/thermo-plasmonics, optical spectroscopy, and 2D materials for energy harvesting. Currently, we are working on synthesizing plasmonic materials, fabrication of various heterostructures of plasmonic metal/oxides hybrid systems for wavelength conversion, detectors, and catalytic applications, and plasmonic architectonics for photothermal energy conversion. In the past year, we have been exploring 2D materials for hydrogen generation and CO2 conversion. Recently, we have demonstrated that the 2D boron monosulfide (BS) nanosheets have several stable phases and unique electronic structures, endowing them with interesting attributes, including superconducting, thermoelectric, and hydrogen storage properties (Journal of Materials Chemistry A 10 (9), 4999-4999 (2022)). Also, it demonstrated the adsorption of CO2 and its conversion to CH4 and C2H6 using hydrogen-deficient 2D hydrogen boride (HB) sheets (Communications Chemistry 5, 1, 1-10 (2022)). We are also working on the development of a metamaterials-based energy harvester quantum photonic devices for infrared detectors/imaging.



2D boron monosulfide (BS) nanosheets and Hydrogen boride (HB) nanosheets for hydrogen generation and CO2 conversion

16. Search for spatial coincidence between IceCube neutrinos and radio pulsars – Dr Shantanu Desai

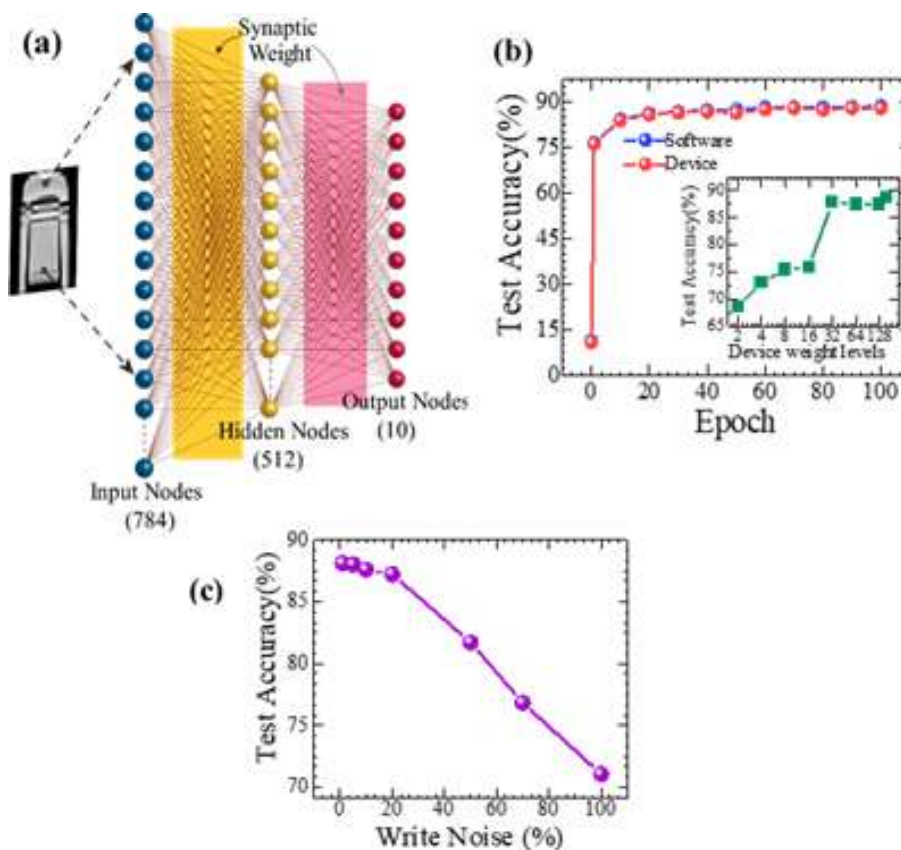
Our group is involved in the search for nanoHz gravitational waves and precision pulsar timing as part of the Indian pulsar timing array consortium (InPTA). InPTA had its first data release last August, consisting of Dispersion measures and timing estimates of 14 millisecond pulsars using 3.5 years of data. A study of single pulsar noise analysis has also been done using this data release (A Srivastava et al., 2023). We are also conducting joint searches for stochastic gravitational wave background along with the European pulsar timing array consortium. In addition, we continue to also work on a diverse range of problems in astrophysics, including Cosmology, galaxy clusters, neutrino astrophysics, Gamma Ray bursts, Machine Learning and Astrostatistics. In cosmology, we have shown that observations of constancy of dark matter surface density from galactic scale haloes are consistent with predictions from LCDM (Gopika, Desai & Paranjape 23). We have also shown that the Radial acceleration relation observed for spiral galaxies is not universal and is not obeyed for elliptical galaxies and galaxy clusters. In the area of neutrino astrophysics, we have done searches for neutrinos from radio pulsars using the IceCube point source catalogue (Pasumarti & Desai 2022). In more “nuts and bolts” related topics, we have also come up with a novel algorithm based on attention-augmented deep learning to remove cosmic rays from images of photometric surveys from Dark Energy Camera and Hubble Space Telescope (S. Bhavanam et al. 2022). This algorithm can be used to remove cosmic rays from images of next-generation surveys such as Vera Rubin LSST.



Skymap distribution of $\sqrt{TS_{max}}$ in Galactic coordinates using Aitoff projection (from Pasumarti & Desai, JCAP,12 002P)

17. Illustration of the artificial neural network (ANN) used for the FMNIST image recognition – Prof Dr Suryanarayana Jammalamadaka

Our group, Magnetic Materials and Device Physics (MMDP) at IIT Hyderabad explores the Magnetic and Quantum transport properties of nanostructured thin films and point contact devices, respectively. Apart from that, we also develop and characterise resistive random access memory devices (RRAM) for bio-sensing, image recognition and neuromorphic applications. Despite all the above, understanding the physics of various magnetic thin films/devices under external stimuli such as magnetic field, electric field, and light is of great interest. Micromagnetic simulations support our experimental data. Important results that we would like to highlight for 22-23 are α -Fe2O3-based artificial synaptic RRAM device for pattern recognition using artificial neural networks [Nanotechnology 34 265703 (2023)], Spin transfer torque Bias (STTB) due to domain wall resistance in an infinitely long ferromagnetic nanowire [Nanotechnology. 1361-6528, (2022)], Anomalous domain wall dynamics in Ir50Mn50/Fe2CoSi bilayers [JMMM 560, 169656 (2022)] and Pseudo magnetic properties and evidence for vortex state in Fe2NiGe Heusler alloy thin films [JMMM 69401, 556 (2022)].



(a) Illustration of the artificial neural network (ANN) used for the FMNIST image recognition

(b) Test accuracy (%) evolution during the training process with respect to the number of epochs. The blue curve depicts the fully software-based implementation, whereas the red curve depicts the synaptic device Ag/ α -Fe₂O₃/FTO based ANN. Inset shows the test accuracy (%) dependence on the number of quantized device weight levels (c) Test accuracy (%) variation with the write noise (%).

18. Outreach Activities

a) Skill Development workshop in Optical Designing-IV, 22nd April 2023, Dr. Vandana Sharma

b) Student workshop for Manthan School, 26th Nov 2022, Dr. Vandana Sharma

c) Fun with Science, DST-MANAK, 25th April 2022, Dr Vandana Sharma

Embarking on a scientific journey is a captivating escapade for kids. Thus, a mesmerizing 2-hour DST-MANAK workshop unfolded, catering to eager middle and high school students. Witnessing captivating demonstrations of optics and wave phenomena delighted the young minds, igniting an enchanting realm of excitement and wonder within them.

d) Skill Development workshop in Optical Designing-III, 25th – 26th February 2022, Dr. Vandana Sharma





Advanced Dark Sky Observatory (ADS0) at IIT Hyderabad

Inventing & Innovating in Technology for Humanity

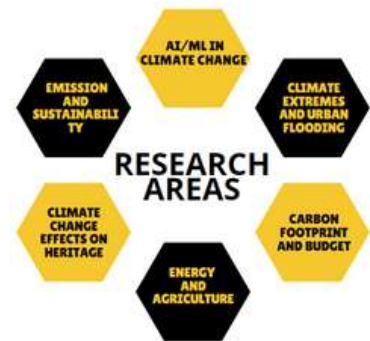
**VIRTUAL
DEPARTMENTS**

Department of Climate Change

The Department of Climate Change has set out on a multidimensional journey embracing a range of essential research fields to solve the urgent issues posed by climate change. Our department's initiatives cover a variety of cutting-edge and significant projects with an uncompromising dedication to increasing environmental sustainability. One such initiative focuses on crafting a representative electric car driving cycle tailored to the unique terrain and road conditions of India. This endeavor seeks to refine energy consumption estimation for electric vehicles, driving the nation closer to sustainable and clean transportation solutions. Additionally, our researchers are pioneering the utilization of Physics-Informed Deep Learning Techniques to identify, characterize, and forecast high-precipitation events in the Indian subcontinent. This groundbreaking approach promises to enhance our understanding of extreme weather phenomena, contributing to more effective climate adaptation and mitigation strategies. Alongside these efforts, our department is at the forefront of developing combustion kinetic models and conducting CFD modeling for innovative fuels, such as Ammonia-Hydrogen-Methane-Diesel blends, which hold the potential to revolutionize combustion technology and reduce emissions. We are also delving into climate responsiveness concerning Hyderabad's built heritage, and investigating the vulnerability of coastal communities in protected islands to the dual challenges of climate change and anthropogenic impacts. These dynamic research pursuits underscore our commitment to tackling climate change comprehensively, across diverse dimensions and forging a sustainable future for generations to come.

In our relentless quest for solutions, the Department of Climate Change remains dedicated to the rigorous pursuit of knowledge, innovative research, and actionable insights. Our journey is marked by collaboration, curiosity, and a steadfast belief that each study, and each project, contributes to a more sustainable and resilient world in the face of climate change. Together, we work to meet the present challenges and foster a brighter, greener future.

For more information, please visit: <https://cc.iith.ac.in/>



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5. Kishalay Mitra, The Experimental Investigation and Numerical Modeling of Heat Absorption Efficacy of Additive Enhanced Endothermic Rocket Fuels; DRDO (230 L).
6. Kishalay Mitra, Robust Wind Energy Conversion System – When Deep Learning Meets Sustainable Energy Utilization; Department of Science Technology, Government of India - National Supercomputing Mission (42 L).
7. Kishalay Mitra, Wind farm layout optimization under uncertainty using wind speed forecasting through probabilistic models and comparison with machine learning algorithms; SPARC, Ministry of Education, Government of India (48 L) (IITH – University of Exeter Collaborations).
8. Maheswaran R, Anomalous Moisture Transport for Hydrological Extremes in a Changing Climate (AMOTHEC) Sponsoring Agency: DST-FCT (Indo-Portugal Bilateral Scheme) Period: 2022-25 (IIT H share (34 L)).
9. Maheswaran R, Understanding the impact of climate change on groundwater resources for Ganga River Basin using Physics based models and AI/ML models Sponsoring Agency: DST - IC IMPACTs (Indo Canada Bilateral Scheme) Period: 2023-25 (Indian Component (54 L)).
10. Dr Shiva Ji, Creating Digital Immersive Heritage Experience, Risk Assessment and Vernacular Architecture Analysis of Five Historically Significant Temple Marvels of Kashi/ DST/MoE - Govt of India (90L).

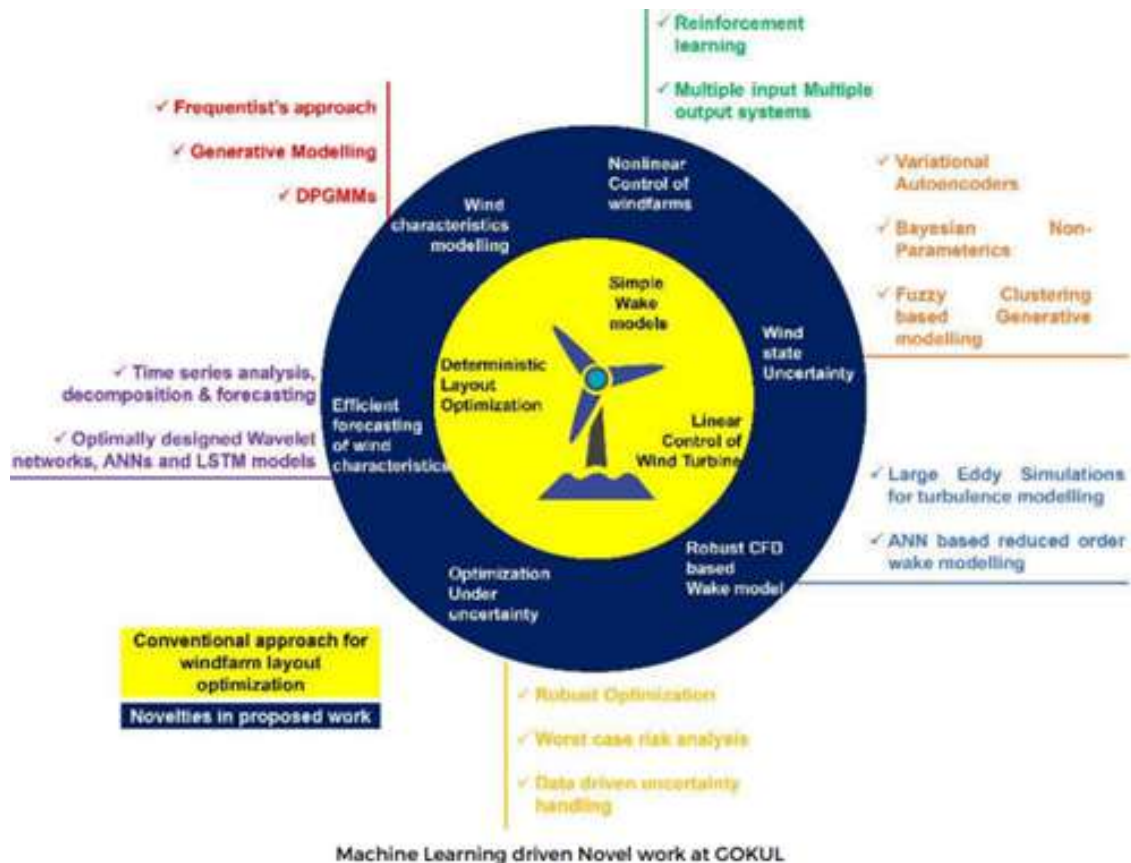
Funded Research Projects:

1. Hari Priya, Co-Investigator, 'Odisha Migration Study', funded by IRRI, December 2022-November 2023 (196,000 USD).
2. Kishalay Mitra, A combined experimental and theoretical approach towards rational design of supported metal catalysts for the reductive depolymerization of corncob lignin to produce bulk aromatic chemicals; Department of Science Technology, Government of India (40.18 L).
3. Kishalay Mitra, Development of an on-board spray controller model for UAVs using AI for precision agricultural application; Department of Science Technology, Government of India (40.18 L).
4. Kishalay Mitra, Development of AI based Model for Coke Quality Prediction and Coal Blend Optimization. Tata Steel (33 L).

Research highlights:

1. Novel AI/ML method based formulations are found to show new directions in most of these applications surpassing the performance of the existing techniques

Global Optimization and Knowledge Unearthing Lab (GOKUL) is engaged in research at the interface of artificial intelligence / machine learning (AI/ML) and their applications on several aspects of climate change. Starting from optimizing performance of several renewable energy generators (wind, biomass gassification) and storage (battery management system), the group is involved in funded research for several other climate and sustainability relevant topics such as finding suitable catalyst for several alternative fuels to maximize yield, maximization of efficiency in drone based precision agriculture, satellite imagery based crop classification, prediction of environmental parameters to combat greenhouse effects etc. Novel AI/ML method based formulations are found to show new directions in most of these applications surpassing the performance of the existing techniques.

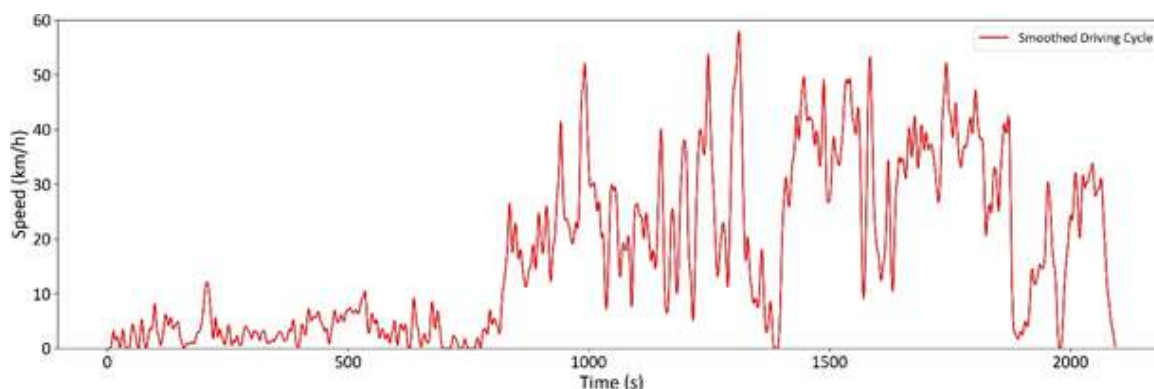


2. Quantitative precipitation estimation (QPE) using Geostationary satellite observations (GEO)

Quantitative precipitation estimation (QPE) using Geostationary satellite observations (GEO) is critical for detecting rapidly developing rainfall events, specifically over regions with sparse or non-existent ground observation networks. The key advantage of GEO observations against other satellites is their high temporal resolution; however, this advantage is underexplored for QPE. The key finding from the study is that incorporating temporal information in QPEs using AI/ML techniques showed that the model is better able to identify rapidly evolving cloud systems that produce heavy rainfall (as against more uniform stratiform precipitation). Another study discusses the significance of more spectral information coming from new generation GEO satellites for QPE studies when compared with previous generation GEO observations. The study highlighted the significance of integrating information from Numerical Weather Prediction (NWP) Models with satellite observations for improving precipitation detection and quantification.

3. Developing a representative electric car driving cycle for energy consumption estimation in Indian road conditions

This research work presents a comprehensive methodology for constructing a representative driving cycle (DC) for electric vehicles (EVs) in Hyderabad, India. The proposed approach combines random selection and k-means clustering to identify distinct driving patterns and traffic scenarios. The vehicle kinematics data used in this study is collected through the on-board method using an Electric Cab Application operating in the city, ensuring comprehensive coverage of the city's central locations. The final Hyderabad Electric Car Driving Cycle (H-ECDC) contains a 2092 s speed time series with an average speed of 17.56 km/h. The k-means clustering algorithm classified the driving data into four clusters: low, moderate, high congestion, and smooth traffic conditions. Evaluating the driving parameters between the entire dataset and the final DC reveals a mean relative error (MRE) of 6.7% and Root Mean Square Error (RMSE) of 0.98, demonstrating the significance of the constructed DC as a representative model. To assess the accuracy of the developed DC, the energy consumption and driving range of an EV model representing the test vehicle is simulated using ADVISOR. The average energy consumption and driving range of the test vehicle under H-ECDC are 15.79 kWh/100 km and 166.53 km, respectively. Finally, the simulation test results are compared with standard and other city-specific driving cycles, demonstrating substantial differences. This necessitates the development of city-specific driving cycles to accurately estimate energy consumption, driving range, and equivalent emissions.



4. Identification, Characterization, and Forecasting of High Precipitation Events and their Characterization using Physics-Informed Deep Learning Techniques for the Indian Subcontinent

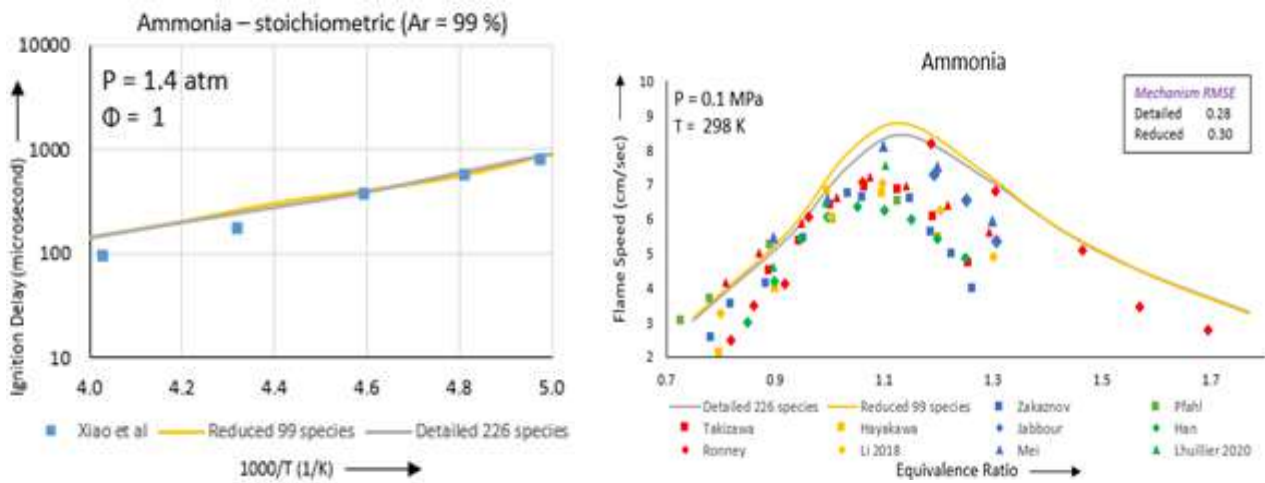
In recent years, recurring high precipitation events (HPE) showcase high spatiotemporal variability, causing large-scale socioeconomic damages. Thus, their accurate forecasting is a critical mission of most global weather services. The primary focus of our work is to detect, characterize, and forecast high precipitation events (HPE) in the Indian region using the capabilities of state-of-the-art artificial intelligence methods. The study was initialized by collecting historical climate datasets to identify HPE using thresholding techniques. This involves developing an innovative approach integrating physics-based and deep-learning models to identify these events effectively. The current work also aims to gain insights into the nature of HPEs and their underlying climatic drivers while creating a new methodology to classify extreme precipitation events based on physical mechanisms. This includes a compilation of HPE events for various application purposes. Of the different HPE triggering mechanisms, this study focuses on Atmospheric river-associated events. Therefore, segregating the AR-associated events and understanding their impacts on Indian precipitation patterns for monsoon and non-monsoon periods is one of the key goals of the current research. Additionally, our study aims to uncover and comprehend the connections between global climate oscillations and AR-associated events to determine the factors that amplify their influence.

Furthermore, the project seeks to use deep learning methods to predict future high precipitation events and extreme occurrences associated with atmospheric rivers and assess their reliability compared to established climate models. As a practical outcome, a web application will be designed to document extreme events, providing insights into historical occurrences and risk assessments while offering a valuable resource for researchers, policymakers, and disaster response teams.

5. Combustion Kinetic Model Development and CFD Modelling of CI Engine Combustion for Ammonia – Hydrogen – Methane – Diesel blend fuels

Decarbonisation of the automotive and energy sectors is of utmost importance to tackle the urgent and global problem of climate change. Compression-Ignition (CI) engines using diesel fuel are commonly used in heavy-duty automotive engines and auxiliary power generators which directly contribute to the global green-house gas emissions. Ammonia (NH₃) as a fuel is being considered as a potential solution in this regard because its oxidation will result in only water vapour and nitrogen. Ammonia is one of the most commonly available chemicals in the world and active research is being pursued to produce ammonia from greener sources of hydrogen. It has a good volumetric hydrogen density and can be stored safely. However, there are a few drawbacks associated with the combustion of ammonia like low flammability,

potential high emissions of nitrogen oxides and low heat of combustion compared to hydrocarbon fuels. Despite these challenges, innovative burner system design has made it possible to successfully operate ammonia-fueled micro-gas turbines in the recent years, thus demonstrating the commercial viability of ammonia as a fuel source. Ammonia can also be considered as a fuel in IC engine systems. The current research aims to tackle some of the outstanding challenges in ammonia combustion through a combination of chemical kinetic mechanism development and CFD modelling of combustion in compression-ignition engines.



Comparison of predicted ignition delay times and flame speeds of ammonia with experimental data

6. Climate Responsiveness and Built Heritage: The Case of Hyderabad City -

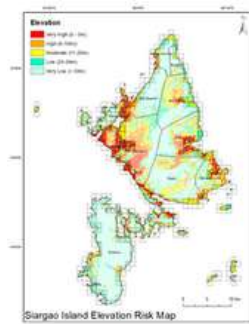
Cultural heritage resources, because of their long history of success, hold the key to solving some of today's most pressing issues, including combating global warming. The present study attempts to understand if built heritage of a city can be a resource to develop a climate responsive built environment in the urban areas through an understanding of physical and behavioural responses to the prevailing climate. The study would also try to understand how the historical built environments have transformed over time, the drivers of transformation, and the impact on their response to the climate and people's needs. The built heritage of Hyderabad city may be ideal case studies for this. The study would attempt to answer the following research questions. Can cultural heritage be a resource for development of a climate responsive built environment?

- A1. How have traditional architectural principles in Hyderabad historically accounted for climate patterns in the region?
- A2. What socio-cultural practices have accompanied the design and use of heritage structures in the city?
- B1. How have patterns of urbanization in Hyderabad impacted the built heritage and the urban built environment?
- B2. What effect does this have on the climate responsiveness of the urban built environment?
- C. How can built heritage be a resource for the development of a climate responsive built environment?

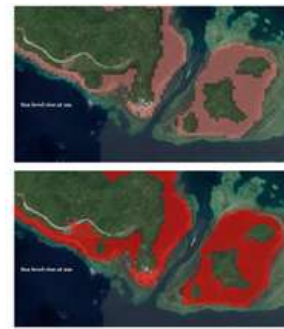
The proposed research may provide a chance that the built heritage in the city can present lessons which can be used to improve the climate responsiveness of such existing structures both in Hyderabad and other parts of the country as well as possibly for the future built environment as well. Through the preservation of cultural heritage, the city may have an infrastructure, which is resilient, people-centric, energy efficient, and sustainable.

7. Vulnerability of Coastal Communities in Protected Islands to Climate Change and Anthropogenic Impacts -

The study aims to assess the changes in coastal habitats over time and determine climatic and anthropogenic impacts on coastal vulnerability and describe the level of communication and local climate governance in Siargao. (1) Coastal vulnerability changes will be determined using the Remote Sensing and Geographic Information System (RS&GIS), incorporating coastal habitat changes in the projection of vulnerability. (2) Bioaccumulation of pollutants, such as heavy metals, will also be assessed to describe human impacts on the island; and (3) a local communication study on climate change awareness and perception will be rolled out, to complement the (4) local climate and environmental policy review on its effectiveness and alignment to the international recommendations. From the outcome of the study, vulnerability maps, communication studies, and policy recommendations will be endorsed to the local government.



Elevation risk and sea-level rise risk mapping



Localized sea-level rise inundation mapping

8. Assessing the Impacts of Anthropogenic Activities on Extreme Events within the Human-Natural Hydrological System -

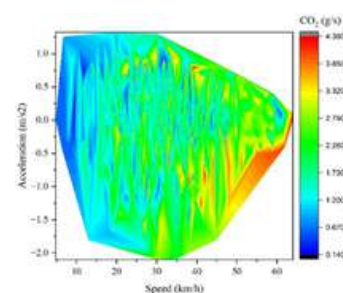
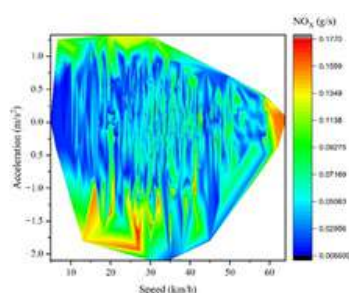
Global climate change and human activities have considerably impacted water resources including the energy budget, and hydrological cycle. Of the two drivers, the former has gained momentum and considerable research progress has been made in understanding the impact of climate change. However, the impact of human activities has not received much attention in the recent past. The water extraction from surface and groundwater resources have increased tenfold over the last few decades. Urbanization and agriculture affect the quantity and quality of the water, regulation of river flow affects the ecological balance and surface water groundwater interactions, and water use, specifically, irrigation can affect the land-atmosphere feedbacks and rainfall. In this era of anthropocene, hydrological system is no longer a natural system rather it must be treated as a human-natural coupled system.

Most of the studies reported above address the direct impact of the human impact on considering the human influence as an external force. However, many times, the impact of anthropogenic activities would have indirect implications. For example, extensive usage of groundwater for irrigation might also affect the runoff and evapotranspiration components not just the groundwater levels. These effects which are generally indirect and are called 'feedbacks of the human activity in the hydrological processes. Apart from these human interventions also infiltrate within the hydrologic system and reflect in terms of floods, and droughts.

With this background, this research aims to develop a complete framework for understanding the direct and indirect impact of human intervention on hydrological cycle.

9. NOX and CO2 emission comparison between diesel and petrol passenger cars on Indian roads -

Nitrogen oxides (NOX) and Carbon dioxides (CO2) emissions are the main issues with modern passenger cars as emission rules tighten, especially when driving in heterogeneous Indian traffic conditions. This study used a portable emission measuring system (PEMS) to compare the CO2 and NOX emissions of diesel and petrol passenger cars that met Bharat Stage IV (BS IV) emission regulations while driving on the same routes. Emission rates and emission factors for CO2 and NOX gaseous pollutants were compared for both vehicle types. PEMS provides accurate and representative data compared to laboratory-based testing, enabling researchers to evaluate real-world vehicular emissions, which may differ significantly from laboratory tests. The results show that the average NOX emission rates for the diesel vehicle for all the speed bins are higher than that of the petrol vehicle, and average CO2 emission rates for the petrol vehicle are higher than the diesel vehicle. Also, NOX emission rates for both vehicle types depend on vehicular speed. In the current study, the average CO2 emission factor for diesel and petrol passenger cars is 197.97 g/km and 556.22 g/km, respectively. The average NOX emission factor for the diesel passenger car is 4.34 g/km, and for the petrol passenger car, it is 0.83 g/km. BS-IV diesel car showed a 5.23 times higher average NOX emission factor than BS-IV petrol car, and BS-IV petrol car demonstrated 2.8 times higher CO2 emissions than BS IV diesel car. In addition, the average EFs for both pollutants were influenced by vehicular speed. This study offers an insightful look at emissions from diesel and petrol passenger automobiles at a time when public transportation and electric mobility are becoming essential.



Department of Engineering Science

"Engineering Science @ IITH" is a broad and interdisciplinary field that combines principles from various branches of science, mathematics, and engineering to solve complex engineering problems and develop innovative technologies. It typically encompasses a wide range of engineering disciplines and can vary depending on the specific specialisation of students' choice. The Department

Key aspects/Achievements in 2022-23 of engineering science include:

1. Mathematics and Applied Sciences: Engineering science often involves a strong foundation in mathematics, physics, chemistry, and other applied sciences. This knowledge forms the basis for understanding and analysing engineering problems.
2. Interdisciplinary Approach: Engineering science programs often encourage students to integrate knowledge from multiple engineering disciplines to solve complex problems. It may involve aspects of electrical, mechanical, civil, chemical, and other engineering fields.
3. Research and Innovation: The engineering science program emphasizes research and innovation, encouraging students to explore new technologies and solutions to real-world challenges.
4. Advanced Topics: Depending on the level and focus of the program, engineering science courses may cover advanced topics such as materials science, thermodynamics, fluid dynamics, and more.
5. Hands-On Experience: Engineering science programs include laboratory work and practical experience to apply theoretical knowledge to real-world situations.
6. Problem-Solving: Problem-solving skills are a fundamental aspect of engineering science. Students are trained to analyse complex problems, design solutions, and implement them effectively.
7. Computational Tools: Given the increasing role of computer technology in engineering, students in engineering science programs often develop strong computational and programming skills.
8. Ethics and Sustainability: Consideration of ethical, environmental, and sustainability factors is also integrated into engineering science programs, as engineers are often tasked with making responsible and sustainable decisions.

Please note that the specific curriculum and focus of engineering science programs can vary between specialisations. Some programs may have a more general approach, while others may specialize in particular areas.

For more information, please visit: <https://es.iith.ac.in/>

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Department of Heritage Science and Technology

In the fiscal year 2022-23, the Department of Heritage Science & Technology at IIT Hyderabad witnessed significant milestones and initiatives. The launch of the Online MTech program for working professionals in Heritage Science and Technology marked a pioneering effort, with 13 students joining the inaugural batch in August 2022. The department further expanded its academic offerings with the introduction of the PhD program in Heritage Science and Technology in January 2023, attracting two students to its first batch.

A key highlight was the Mahayogini Rajyalakshmi Devi (MRD) Heritage Research fellowship launch on November 2, 2022, in collaboration with the Sri Visweswara Yoga Research Institute. This initiative aims to foster robust research in frontier areas of Heritage assets, offering selected scholars an enhanced fellowship and funding for international conference travel.

The Online MTech Contact Program in December 2022 brought the first batch together for stimulating offline sessions, providing valuable insights into coursework and future project ideas through state-of-the-art lab tours and demonstrations.

The department also showcased its interdisciplinary approach with the HST Musical Evening on March 18, 2023, supported by the Department of Science & Technology under the Science Heritage Research Initiative. Noteworthy lectures and demonstrations by industry experts and adjunct faculty, coupled with soulful performances from IIT Hyderabad professors, made the evening a memorable exploration of the intersection of technology and music in India's heritage. The commitment to excellence in research and education remains paramount as the department strives to create a benchmark in the field of Heritage Science and Technology.

For more information, please visit: <https://www.hst.iith.ac.in/>

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Highlights:

Launch of the online M.Tech program for working professionals in Heritage Science and Technology - August ,2022

13 students joined the first batch of M.Tech in HST

MRD fellowship launch for PhD in HST - IITH & SVYRI 2nd Nov'22



- IT Hyderabad - Department of Heritage Science and Technology and Sri Visweswara Yoga Research Institute (SVYRI) announce Mahayogini Rajyalakshmi Devi (MRD) Heritage Research fellowships for PhD in HST
- Meritorious students with strong credentials in various disciplines will be selected through a rigorous process
- MRD scholars will draw an enhanced fellowship (Rs. 75,000/ month) and funding for travel to an international conference
- Robust, empirically quantifiable research in the frontier areas of Heritage assets will create strong commercial interest in Indic resources such as Ayurveda, Yoga, etc. It is important to perform research of the highest quality and publish in well-regarded fora, and IITH will strive to create a benchmark in the area of Heritage Research.

Launch of the PhD program in Heritage Science and Technology - Jan 2023

2 students joined the first batch of HST



Online M.Tech Contact Program 10th-11th Dec'22

- The first batch of the Online M.Tech Program came together for the End Semester Contact Program - with brainstorming sessions related to coursework and future project ideas, state-of-the-art lab tours and demonstrations. The two-day offline interactive sessions proved to be stimulating and offered valuable insights to the students.



HST Musical Evening - "Technology getting Musical" 18th Mar'23

- The Department of Heritage Science and Technology, IIT Hyderabad, hosted an enthralling HST Musical Evening inaugurated by Dr. Srivari Chandrasekhar, Secretary, Department of Science & Technology, Govt of India and graced by Shri. Akhilesh Jha, Chief Controller of Accounts, DST.
- This event was to showcase the best practices and explore the prospects of using technology in the field of music. The department and the event are supported by DST under its programme- Science Heritage Research Initiative (SHRI).



- "MADE-IN-INDIA music synthesizers since 1979" lecture demonstration by Mr. G. Raj Narayan and Mrs. Radhika Rajnarayan of Radel electronics was an experience to relish forever. 'Radel' brand electronic Tanpura, Tabla, and now their Veena and Harmonium addition to their musical instrument range over five decades is an excellent example of constructive technology addition to the tangible and intangible heritage of India.
- Another lecture demonstration on Music info Research was by Dr Ajay Srinivasmurthy, from Amazon Alexa - also adjunct faculty of HST. The prototypes developed by him are going to help us use our digital music libraries more than the usual practices of creating playlists based on artists, genres and other column titles.
- The last technical session was by the famous music director Shri Ramesh Vinayakam on his 'Gamaka Box'. He made everyone present in the auditorium sing the most difficult taans by following the signs of his 'Gamaka Box'.
- Apart from the technical sessions, the evening was filled by wonderful classical performances from the professors of IITH. A superlative vocal performance by Dr Satyavrata Samavedi, supported by Dr Mahesh Ganesan on Kanjeera, and the devotional kritis of Carnatic music by Prof Sivaramakrishna Vanjari was a soulful treat

Inventing & Innovating in Technology for Humanity

CAMPUS CHRONICLES

BUILD Project

BUILD program is a Bold and Unique Ideas Leading to Development. Its objective is to Promote creativity and innovation among students. With a duration of 6 months and Funding of up to 1 Lakhs. Outcome – is to create a Product/prototype (hardware or software or app) and it is open to all students of IITH, BTech/BDes/MTech/MDes/MSc/PhD. The call for proposals is done twice a year.

A few BUILD Projects for the Financial Year 2022-2023:

S. No.	Title of Project	Team Leader	Team Members
1	Postpartum Hemorrhage Management	Komal and Manabendra Sandilya	Komal and Manabendra Sandilya
2	Inexpensive Portable CO ₂ -oximetry device for in-Home/Remote Cardio-pulmonary status assessment	S Ananda Theertan	Vaibhav Arun Rachalwar and Prateek Ranjan,
3	Designing flexible printed sensors to determine the pressure and temperature of the contact surface/skin during HIFU therapy	Shaswata Chowdhury	Shaswata Chowdhury
4	3D-printed chamber for testing of eye drop formulations using cornea model	Sayantana Ghosh	Debasmita Saha
5	Multispectral Narrowband Imaging Probe for Enhanced Oral Tissue Inspection	Amandeep Singh	Pawan Kumar and Nikhil Prakash
6	Development of a distributed prototype of a microcontroller-based appliance scheduler for facilitating peer-to-peer energy sharing in a Residential Apartment	Cherala Vikram	Heera, Abhishek Joshi, and Aqsa Siddiqua
7	HAWW- Satirical Game design on societal pressures of gender stereotypes in India	Sandra RS	Sandra RS, and Pavan



Multispectral Narrowband Imaging Probe for Enhanced Oral Tissue Inspection



Inexpensive Portable CO₂-oximetry device for in-home/Remote Cardio-pulmonary status assessment

Tinkerer's Lab



It was a proud year for the lab as we completed five years of existence this tenure. The year was a golden year for the lab as it continued to expand itself beyond its previous milestones and went on to create its name and fame across all the IITs with Tinkerers' Lab as we increased the number of projects looking forward to incubation and revived events at an extraordinary scale. Another factor that distinguished us and made us role models for other Tinkerers' Labs was the way we rearranged ourselves in domains and departments of specific technical supremacy and went ahead to give the students in Tinkerers' Lab a better set of guidance. We also changed our timings from 6 PM - 1 AM to being a 24/7 lab, a place where the spirit of Tinkering never sleeps.

Speaking of events this year, the lab made itself profound amongst the student base by organizing events that the people could look forward to attending and enjoying. Starting with the highlight of the year, Tinkerers' Lab was a prime collaborator with Kludge this year for CyberCon, which saw a footfall from over 700 people within the college only and had long-lasting impacts on the student-led work on Information Security in IITH. Tinkerers' Lab also conducted Tinkering 101 Chapter 1 and Chapter 2, where we taught students of our college about TinkerCAD and ESP32, respectively and the sessions were very well received by the student crowd. Speaking of that, Tinkerers' Lab also organized its annual Tinkering Night, where many people came, forgetting about their sleep, to work overnight to solve a problem statement given to them.

Another thing that Tinkerers' Lab is proud of this year is the development of it into a hub like structure for student activities.

Tinkerers' Lab hosted people working on their Inter IIT Problems to give them a unified shelter to work at, it acted as a hub for the Sci-Tech Council to come and work on their projects and the lab also major events like MILAN and ELAN AND NVISION knock the doors to make the stages for their technical events.

Speaking of projects, the lab saw a major boom in the number of projects worked on in the lab. Some of the most sparkling projects taken on by the lab were the following.

- Energy Harvesting Rails - Prandipan Sahoo
- Unified Security System - Abhay Kumar
- Fall Detection System - Aadil Salim
- Cost-effective Syringe Pump - Arsh Arora
- Electromagnetic Breaking - Gaurav Sati
- Caterpillar Robot - Robotix
- Chess Bot - Elektronika
- Inter IIT Problem Statements - Team IITH
- Robotix-TL Projects - IITH Students

Finally, it would be safe to say that the number of people who knocked on the TL door for projects didn't go unanswered this year, and the lab had a very positive year and looks forward to an even better year ahead under the aegis of our ever supporting FiC's Dr Sushmee Badhulika and Dr Vishwanath Chinthapentha, along with our highly supportive parent organization, Makers Bhavan Foundation.

If in case any query may arise, kindly reach out to the undersigned.

Sincerely,

Arsh Arora, Events and PRO Secretary, Tinkerers' Lab
Ph.no.: +91 79992 24011

Ek Bharat Shreshtha Bharat



Bathukamma & Dandiya Celebrations



The Ek Bharat Shreshtha Bharat (EBSB) club of IITH organized a Bathukamma/ Dandiya night event. Flowers were bought and given to the participants by EBSB. The flower pyramids were soon decorated and arranged by people. They were then positioned in the center of a circle, and people started to dance around it.

Later that night, Dandiya began. The event was graced by our honorable director, Prof B S Murty. All attending members had a great time dancing and having fun.



Dia, Rangoli Making Competitions & Sky Lanterns



On the eve of Diwali Students enjoyed painting the diyas which they were given to decorate with stones. Students actively participated in this competition. They demonstrated their ingenuity by painting earthen Diyas with colors. Next day to create a festive atmosphere on the campus, participants constructed imaginative and colorful Rangolis. When it came time to celebrate Diwali, crowds gathered on the mess lawns. The sky was ablaze with stars and lanterns, and the scene was breathtaking. Everyone cheered as they released the sky lanterns into the sky.



The EBSB club of IITH organized a kite-flying event to celebrate the festival. It was held in an open space near the mess. Students turned up in huge numbers for the event, and more than 300 kites were flown.

On the eve of Makar Sankranti the EBSB club built a bonfire for the IITH community; Our honorable director Prof B S Murty ignited the bonfire. As The drummers began their performance, everyone began dancing the Bhangra to the beats

Kite Flying, Bonfire & Bhangra Celebrations



Solar Observation & Sports Sessions

On Makar Sankranti, as the sun god Surya is worshiped, it is also necessary to look at the sun directly so that our respects can be paid. In collaboration with Cepheid, the Astronomy and Astrophysics club of IITH, EBSB organized a solar observation event.

Sports are a vital part of Makar Sankranti celebrations. People who celebrate Makar Sankranti play sports like kho-kho and jallikattu. To bring the student community together, EBSB organized sports events as a part of the Makar Sankranti festival.



Holi Celebrations

This year, the EBSB club successfully and enthusiastically coordinated the Holi activities. People put aside their differences and rejoiced in life's simple pleasures during this time.

The college administration takes strict measures to ensure students adhere to safety precautions while participating in festivals. The use of natural colors and staying away from water balloon throwing, which might result in injury, are urged to the students.



NSS Activities



During the period of May 2022 - March 2023, NSS IIT Hyderabad (NSS IITH) proactively conducted 55 events trying to inculcate a sense of service to the community and oneself at IITH. A total of 600+ volunteers participated in various activities organized by NSS IITH. Under the able leadership and guidance of the faculty in-charge, NSS IITH pledged to devote its best efforts to the betterment of society. NSS IITH has around 600+ registered students for the academic year of 2022-23, and the count keeps on increasing. Here are a few activities undertaken during the period of May 2022 - March 2023.



Orphanage Visit

The NSS team visited "Shishu Mangal Orphanage Home for Girls and Boys" located at Nalagandla, which had around 40 children and donated them a few boxes of clothes we received from a donation drive.

Udaan is a regular event that NSS conducts to share knowledge with the students of nearby villages. It is an event which is conducted on every possible Sundays.

Udaan



Weed Removal Drive

The event is organized on the premises of the IITH campus by the NSS Team in collaboration with the Plant Cell of IITH to remove weeds like Parthenium & Subabul.



Fitness Walkathon

World Heart Day, 29th September 2022, The walkathon was conducted to signify the importance of cardiac health in modern times. Event saw an overwhelming participation by 172 students.

Vidyadaan is an attempt to share knowledge with children of government schools. Volunteers are divided into a group of 3 to 4 & taught students from classes 1st-9th. A total of 40 NSS volunteers engaged in teaching around 250+ students.

Vidyadaan



Blood Donation Camp

On Independence day, many faculty, & staff members, along with director Prof B S Murthy and previous NSS Faculty In-Charge Dr Prem Paul, donated their blood. 137 units collected out of 150 registrations.



Donation Campaigns

NSS IITH conducted Book & Cloth Donation Drives where students donate books & clothes that could be of better use somewhere else. The donations are made to orphanages and old age homes near IITH.

Swachh Bharat is an event which is organized inside the premises of the IITH campus by the NSS Team to maintain a clean, healthy and beautiful campus. Swachh Bharat is conducted twice every month.

Swachh Bharat



Weed Removal Drive

The event is organized in the premises of the IITH campus by the NSS Team in collaboration with the Plant Cell of IITH to remove the weeds like Parthenium & Subabul.



Ambedkar Jayanti

On the occasion of Ambedkar Jayanti (14th April), the NSS Team, IITH conducted the Essay Writing and Drawing Competitions to the students of IITH.

On the occasion of World Health Day (7th April), the NSS Team, IITH conducted the Essay Writing and Drawing Competitions to the students of IITH.

World Health Day



World Autism Awareness Day

On the occasion of World Autism Awareness Day (2nd April), the NSS Team, IITH conducted Article Writing, Case Study, Poster Making Competitions to IITH Students.

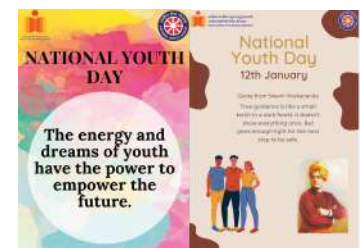


International Yoga Day

On the occasion of International Yoga Day (21st June 2022), the NSS Team, IITH conducted Poster making, Essay writing, Infographics, and Video making with the theme "Importance of Yoga in the present times".

On the occasion of Vigilance Awareness Week 2022 (31st October to 6th November), the NSS Team, IITH conducted online events: Poster Making, Comic Making, and Essay Writing.

Vigilance Awareness Week



National Youth Day

On the occasion of National Youth Day (Jan 12, 2023), birth anniversary of Swami Vivekananda, NSS Team, IITH conducted online events, Essay Writing, Poster Making, Case Study, to generate awareness of importance & impact of Youth in our country.

Prakriti Club



Prakriti Club, a nature club at IIT Hyderabad, is here to increase student interest in nature-related issues, as well as to encourage technological engagement in saving nature and progressing sustainable development. We have nature enthusiast members from different branches who contributed with almost no structural hindrance. Objectives of Prakriti include raising awareness about issues related to the environment among the campus residents. With our club's multidisciplinary nature, we are able to develop unique solutions to prominent challenges in nature.

Events Conducted:

On every natural occasion, our club sponsored several nature-related events, which bridged the gap created by the contemporary world between nature and students. We started with the Van Mahotsav Saptah (Tree Festival Week) with a Plantation Challenge to combat various environmental challenges such as deforestation, erosion, and global warming and enhance the beauty and harmony of the ecosystem. Numerous artistic activities, such as the Nature Art Competition, Essay Writing Competitions, and Leaf Painting and Carving Contests with the theme of the 75th Independence Day, Article Writing Contests on



Natural resources of India pre and post-Independence were conducted to encourage pupils to explore the natural world in creative ways.

Prakriti held many ideathon contests (MILAN 2022) to stimulate students to think about ways to tackle environmental challenges. Techy events such as soil moisture sensor making and the creation of a Dynamic App to store flora and fauna information in collaboration with Lambda IITH were held following a tour of the Waste Treatment Facilities on Campus for the 2022 BTech 2022 batch.

Club Activities:

Started publishing Prakriti's Weekly Nature Feed from August 16, 2022, on the official Instagram page to inform students about environmental news.

Projects:

We are involved in several environmental projects, such as the River Plastic Strainer project, which works to clean rivers for a better tomorrow, and the Smart Plug project to ensure energy efficiency and eliminate energy waste in homes. In addition, we have forthcoming projects of App Development.



EML Series

The Extra Mural Lectures team at IIT Hyderabad work to bring decorated personalities from eclectic domains on one platform to talk about various subjects like art, social work, economics, psychology, sports, science, etc, and inspire our IIT Hyderabad fraternity with insights that they could induce in their lives.

Extra Mural Lectures



A talk on "Tackling the Diabetes Epidemic: Some Success Stories from India" by Dr Viswanathan Mohan, Chairman and Chief of Diabetology, Dr Mohan's Diabetes Specialities Centre



A talk on "The Free Software Movement and GNU" by Dr Richard Stallman, Founder of Free Software Foundation, United States



A talk on "Excitements of Space and its Relevance to the Nation" by Dr B N Suresh, ISRO Scientist & Padma Shri & Padma Bhushan Awardee



A talk on "Notes on Technology, Entrepreneurship, and the Future" by Dr Ajai Chowdhry, Co-founder of HCL, Padma Bhushan Awardee, and Former Chairman of BoG IITH

DIESTA



Introduced in 2021, Diesta is an annual Interdepartmental sports & cultural fest of IIT Hyderabad. All the departments are divided into 7-10 teams. All the teams put their best foot forward to take away the ultimate trophy, the glory of being the best of them all. The gust of euphoria that DIESTA brought with itself is unparalleled.



The opportunity gave students the much-needed exposure to introduce themselves to the entire IITH. People thoroughly enjoyed the other dance, music, and literary performances. The euphoria that DIESTA had filled the people with was still alive. Those memories are etched in our hearts forever.



ELAN & ηVision



Elan & ηVision is the annual techno-cultural fest of IIT Hyderabad and among the most prominent college fests in South India. Since its inception, it has touched thousands, leaving behind beautiful memories in the hearts of everyone involved with us.

Elan & ηVision 2023 with the theme of “Secrets of Valenrow” has been one of the biggest extravaganzas of the year, enveloping the ultimate entertaining and enthralling experience held from 17th February to 19th February 2023. The event was completely filled with several artists, gracing the fest with their enthralling performances.

The 14th edition of this 3-day grandeur celebrates the notion of mystic powers and magic and promises



to leave you enchanted with the theme, “Secrets of Valenrow”.

The social cause theme for this year is ‘Ikshana - Save Animals’. Because of human greed, animals have become a target of abuse. One of the major concerns of today’s modern world, we aim to give the issue a much-needed limelight and attraction. Animals also have the full right to live on earth as much as human beings have. We believe that every creation of mother nature should be treated with love, respect, and compassion.



MILAN 2022



The events of MILAN 2022 commenced on the 9th of September. The Cultural and Sci-tech Events started as planned. But due to unprecedented weather conditions, the outdoor sports events needed postponement.

The opening ceremony of MILAN 2022 was held on September 10th in the presence of our beloved HCU, Dr Saravanan Balusamy. The opening ceremony included the release of the MILAN promo video, Launch, demonstration of our official website, and an energetic performance by the Shuffle Crew.

It was followed by a torch rally to the football ground. We would also like to thank SBI, Pure EV, ICICI Bank, HDFC, Isthara, Shakti's Kitchen, R Gouras, and Red Bull, who sponsored our event and helped us make MILAN 2022 a great success.

Sports Events

The sports events consisted of 16 events. Many of the events like badminton, table tennis, and squash started as planned and received participation from all the blocks and e-sports consisted of Valorant, CSGO, fall guys, and Clash royale.



Cultural Events

The cultural events were exciting and crowded. From the energetic performances by the students in the dance and singing competitions to the calculated involvement in dumb charades and codenames to the fantastic fashion show performances, the cultural events were a complete success.



Science & Technology Events

This edition of MILAN witnessed some new & different SciTech events like Robo soccer, RC car racing, water rocketry, etc. The events were fascinating to watch and fun to participate in. Kautilya hostel block became the overall champion in SciTech events.



Pronites

As we know, there is no perfect end without an ashy night; the MILAN team has organized a fun-filled stand-up set by Vivek Muralidharan, followed by a DJ night by DJ Scintillate from Prism which acted as a stressbuster to the entire student community after a tiring week.



E-Summit



E-Summit aims to bring early entrepreneurs, students, corporates, venture capitalists, and start-ups with burgeoning ideas from all over the country to one platform. E-Cell, IIT Hyderabad's annual flagship event E-Summit 23-'An Arduous Carrefour', organized on the 20th to 22nd of January, 2023, was a phenomenal success! It featured prominent entrepreneurs and corporate professionals from across India. The topics of prime importance today, ranging from massive layoffs and digital payments to technological innovations, were debated and discussed from various perspectives.

This year's list of Keynote speakers includes:

1. Rama Iyer- Head Innovation at GMR group
2. Dr Shanta Thoutam- Chief Innovation Officer, Govt. of Telangana.
3. GV Krishna Gopal - Group Chief Executive Officer at Access Livelihoods Group.
4. BVR Mohan Reddy- Founder Chairman & Board Member- Cyient I Author - Engineered in India
5. Dr Ravi Shankar Polishetty- Presenting Docture - Poly, the world's only Non-Invasive OMICS tracker and digital doctor Assistant.
6. Sandip Poddar- Startups mentor of STPI-SWIFT program at IIM Calcutta Innovation Park and T-Angels Program of T-Hub.
7. Udaya Dintyala- Exec. Director - ITO at AT&T Global Business Services India.
8. Avishek Gupta- Managing Director and CEO (Caspian Debt).

This year's list of Topics for Panel Discussions includes:

1. Transformation of India's digital payment landscape
2. The Employer-Employee Paradox: Concurrency of Layoffs and Hiring
3. Technological Innovations: The driving factors and Impact

E-Cell, IIT-Hyderabad strives to meet the aspirations of its theme-'Think, Build, Inspire'. E-Summit gave an exemplary push to the entrepreneurial wisdom of the students. It provided a common platform for social, tech, and fin-tech entrepreneurs to put forth their views on the looming recession and ways to grow stronger. The organizers expressed profound gratitude towards the sponsors, speakers, panelists, and moderators for their time and efforts in making the event a wonderful one.



ENTREPRENEUR

Japan Day



Japan External Trade Organization (JETRO) and IIT Hyderabad (IITH) co-hosted the fifth edition of the job fair “JAPAN DAY” on September 24, 2022. The event was held in person mode after two years of online events. It was overwhelming to host 10 Japanese companies in the in-person mode for the 1st time post-pandemic. The companies comprising startups, SMEs, and large corporates, participated in promoting their businesses/cutting-edge technologies to attract students from IITH.

JETRO, in association with IITH, has been conducting “JAPAN DAY” at IITH since 2018; 10 Japanese companies, mostly large corporations, joined the event in 2018. Subsequently, 5 Japanese companies, mainly startups, joined in 2019. In 2020, the first-ever online “JAPAN DAY”, we got an overwhelming response, and the number of companies increased to 20.

More than half were startups aiming to recruit top Indian talents to develop their technologies and products to compete in the global market. The numbers were promising in 2021, with 13 companies participating during the peak of the pandemic.



The following ten firms participated in the 5th edition of Japan Day 2022:

1. I'm beside you Inc. (Startup): Software, AI, Mental Health, Education
2. AWL, Inc. (Startup): Software
3. Asahi Kasei Corporation (Corporation): Manufacturing - Chemicals
4. Asilla, Inc. (Startup): AI, Computer Vision
5. Takasago Electric, Inc. (SME): Design, Manufacturing and sale of precision parts
6. DENSO International India PVT. LTD. (Corporation): Automobile
7. Progummy Inc. (Startup): EdTEch
8. Mercari, Inc. (Corporation): e-commerce
9. Fujitsu Limited (Corporation): communication systems, manufacturing, & sale of information processing systems and electronic devices, & provision of related services
10. DeNA (Corporation): Game, entertainment, live streaming



New Infra @Campus



BVR Mohan Reddy School of Innovation & Entrepreneurship

Shri Dharmendra Pradhan, Hon Minister of Education, laid the foundation stone for BVR Mohan Reddy School of Innovation & Entrepreneurship.

TIP has a total built-up area of 14313 sqm, consisting of 11 blocks with a G+5 structure, is ready to support the incubation activity at IITH

Technology Incubation Park



Research Centre Complex building

RCC is a five-storied (G+4) building with an attractive oval shape with a total plinth area is 12,325 Sqm.



5G Test Bed

5G Testbed has been inaugurated by Prof B S Murty, Director, IITH at IIT Hyderabad Campus.

IITH Married Students Hostel has been inaugurated. A glimpse of the ceremony: https://youtu.be/DK_6B_gwybs

Married Student Hostel



ICICI E-LOBBY

ICICI e-lobby has been inaugurated at IITH Campus



Testbed for Autonomous Navigation

Hon'ble Minister of State for Science & Technology & Earth Sciences, Dr Jitendra Singh, inaugurated 1st Testbed for Autonomous Navigation at IITH

Hybrid Classroom has been inaugurated at IITH by Astra Microwave Pvt. Ltd.

Hybrid Classroom



Chemistry Department Building

The Chemistry Department Building has been inaugurated by Distinguished Professor Goverdhan Mehta at IITH.



NCC

IITH welcomed NCC into its fold, inaugurated by our beloved Director, Prof B S Murty.

IITH is delighted to have "Little Munchkins", a New Day Care, inaugurated by our beloved Director Prof B S Murty.

Little Munchkins



Open Air Theatre

Students at IITH exuberantly embraced the entry into New Year 2023 with fun-filled Cultural and DJ night in the new OAT.



Advanced Darksky Observatory

Celebrating National Science Day, IITH established an 'Advanced Darksky Observatory' inaugurated by Dr K Radhakrishnan, Honorary Distinguished Advisor in the Department of Space and Former Chairman of ISRO.

IITH established a Ground-breaking Raindrop Research Facility (RRF) inaugurated by Dr VK Saraswat (Hon'ble Member, NITI Aayog, Government of India)

Raindrop Research Facility



Electron Microscope

Inauguration of demonstration-purpose Scanning Electron Microscope by Thermo Fischer in the Department of MSME

Collaborations



Our collaborative partnerships with industry and other institutions have strengthened, resulting in impactful interdisciplinary research projects; IITH inked pacts with NIT Sikkim; NIT Nagaland; NIT Agartala; and CSIR NEIST Assam; Commissionerate of Collegiate Education, Govt of Telangana; Kathmandu University; CMOS - College of Medical Sciences; IIIT Hyderabad; ICAT; Cyient; WiSig; EFLU.

IITH inked MoU with DRDO for the DRDO-Industry-

Academia (DIA) Center of Excellence; Suzuki Motor Corporation; Sri Visweswara Yoga Research Institute (SVYRI); Tata Consultancy Services; Hexagon; National Centre for Additive Manufacturing (NCAM); Auckland University of Technology; Indian Navy/ WESEE to establish a Co-Developmental Technology Innovation Centre (CTIC); Greenko to set up a School of Climate Change & Sustainability; NHAI; Beyond Next Ventures India Pvt Ltd (BNVI).

Non-Teaching Staff (FY 2022-2023)

S. No.	Name	Designation	Pay Level
Academic Section			
1	Devadevan V	Deputy Registrar(on Deputation)	12
2	V S Sastry	Assistant Registrar	10
3	M Venkatesh	Assistant Registrar	10
4	Archana Singh	Assistant Registrar	10
5	Rongala Lakshmi Prasanna	Section Officer	8
6	Reddi Meena Kumari	Section Officer	8
7	Budeti Pradeep Babu	Executive Assistant	6
8	Janardhankumar Tolana	Executive Assistant	6
9	Rajashekhar Soudhari	Executive Assistant	6
10	S Hemalatha	Executive Assistant	6
11	T Lavanya	Executive Assistant	6
12	K Sreenivasa Reddy	Assistant	4
13	J Rebekah	Junior Assistant	3
14	S Samuel	MSA II	2
Administration			
1	Comde Manohar Nambiar	Registrar	14
Registrar Office			
1	Beera Suresh Kumar	Executive Assistant	6
Artificial Intelligence			
1	D Ravi Kumar	Technical Superintendent	8
2	Vikram Singh Kanawat	MSA I	1
Biomedical Engineering			
1	Chavan Sagar Babanrao	Veterinary Doctor	10
2	Khandagale Sudarshan Baburao	Technical Superintendent	8
3	Krushna Chandra Hembram	Technical Superintendent	8
4	Sairam M	Technical Superintendent	8
5	Saransh Khandelwal	Technical Superintendent	8
6	B Jayalakshmi	Technician	4
7	K Velmurugan	Assistant	4
8	J Manikyam	Junior Technician	3
9	Pulla Prashanth	Junior Technician	3
10	Rebba Vinod Kumar	MSA I	1
Biotechnology			
1	Pulala Raghuvver Yadav	Technical Officer Grade I	10
2	M Jayavardhana Reddy	Technician	4
3	K Velmurugan	Assistant	4
4	N Ashwini	Technician	4
5	Venkatakrishnaprasad SM	Junior Technician	3

CCE				
1	Priyanka Patheparapu	Executive Assistant	CCE	6
Central Workshop				
1	A Praveen Kumar	Technician	Central Workshop	4
2	Ajith Kanakambaran	Technician	Central Workshop	4
3	Dhananjay Sahoo	Technician	Central Workshop	4
4	Lingamaiah B	Technician	Central Workshop	4
5	Lohakare Pramod Maroti	Technician	Central Workshop	4
6	M Srinivas	Technician	Central Workshop	4
7	Vadla Brahma Chary	Technician	Central Workshop	4
8	Munugala Dakaiah	Junior Technician	Central Workshop	3
Chemical & MSME				
1	Harish Ramineni	Executive Assistant	Chemical & MSME	6
2	Cheemakurthi M Subhani	MSA I	Chemical & MSME	1
Chemical Engineering				
1	Suman A Gupta	Technical Officer Grade I	Chemical Engineering	10
2	Nama Someshwar Rao	Technical Superintendent	Chemical Engineering	8
3	P Gayathri	Technical Superintendent	Chemical Engineering	8
4	Ramireddi Hari Krishna	Technical Superintendent	Chemical Engineering	8
5	V Bhadra Rao Koruprolu	Technical Superintendent	Chemical Engineering	8
6	Harish Ramineni	Executive Assistant	Chemical Engineering	6
7	P Nagarjuna	Technician	Chemical Engineering	4
8	T P Lalitha	Technician	Chemical Engineering	4
9	Bharath G Relekar	Junior Technician	Chemical Engineering	3
10	Ch Venkata Krishnaiah	Junior Technician	Chemical Engineering	3
11	Cheemakurthi M Subhani	Multi Skill Assistant Gr.I (General)	Chemical Engineering	1
Chemistry				
1	Kota Venkata Satya Girish	Technical Officer Grade I	Chemistry	10
2	MD Samiuddin	Technical Officer Grade I	Chemistry	10
3	Ashok Yeligeti	Technical Superintendent	Chemistry	8
4	Gottapu Naga Satish	Executive Assistant	Chemistry	6
5	Patange Rooby Clarest Melody	Technician	Chemistry	4
6	Pentakota Sree Ramana Babu	Technician	Chemistry	4
7	Poondla Vijaya kumar	Technician	Chemistry	4
8	Guguloth Venkanna	Junior Technician	Chemistry	3
9	Janapati Srinu	Junior Technician	Chemistry	3
10	Srinivas Pulimamidi	Junior Technician	Chemistry	3
11	Singam Sampath	Junior Technician	Chemistry	3
12	Surender B	Junior Technician	Chemistry	3

Civil Engineering				
1	Bhukya Ramakrishna	Technical Superintendent	Civil Engineering	8
2	Gourav	Technical Superintendent	Civil Engineering	8
3	Jitendriya Raul	Technical Superintendent	Civil Engineering	8
4	Kaleeswaran P	Technical Superintendent	Civil Engineering	8
5	Sankepally Saikiran	Technical Superintendent	Civil Engineering	8
6	Srikanth K	Technical Superintendent	Civil Engineering	8
7	Yaseen Sherief Mohammed	Technical Superintendent	Civil Engineering	8
8	S Mani Kumar	Executive Assistant	Civil Engineering	6
9	Kandhukuri Sandeep Kumar	Technician	Civil Engineering	4
10	Viswanath B J	Technician	Civil Engineering	4
11	Rajesh Kumar	Junior Technician	Civil Engineering	3
Clinic				
1	Kanaparthi Anilkumar	Sr.Medical Officer	Clinic	11
2	Baishakhi Chandra	Medical Officer	Clinic	10
3	Sonia Madhav Naik	Medical Officer	Clinic	10
4	T Raja Adharnath	Medical Officer	Clinic	10
5	Avvari Vedavani	Physiotherapist	Clinic	6
6	Takkoli Sivakrishnareddy	MSA I	Clinic	1
CMD				
1	K S Ravindra Babu	Superintending Engineer	CMD	13A
2	Mahankali Sateesh	Executive Engineer (Civil)	CMD	11
3	Sushant Vatsa	Executive Engineer (Electrical)	CMD	11
4	Datla Praveen Kumar	AEE(Civil)	CMD	10
5	P Srinivasulu Yadav	AEE (Electrical)	CMD	10
6	S Pramod Kumar	AEE(Civil)	CMD	10
7	Altaf Hussain	Assistant Engineer (Electrical)	CMD	8
8	Menda Chiranjeevi	Assistant Engineer(Civil)	CMD	8
9	Nadiminti Nagaraju	Assistant Engineer (Electrical)	CMD	8
10	Patibandla Srikanth	Assistant Engineer(Civil)	CMD	8
11	Sivakrishna Reddy	Assistant Engineer (Electrical)	CMD	8
12	Surender Banoth	Assistant Engineer(Civil)	CMD	8
13	Vanam Aneesh	Assistant Engineer (Electrical)	CMD	8
14	Vinay Kumar Beesa	Assistant Engineer(Civil)	CMD	8
15	Amaraneni Sai Teja	Junior Engineer (Civil)	CMD	6
16	Chandra Sekhar Reddi	Junior Engineer(Electrical)	CMD	6
17	Chityala Anand	Junior Engineer (Civil)	CMD	6
18	Divakar Kumar	Junior Engineer (Electrical)	CMD	6
19	Gummadi Anil Kumar	Junior Engineer (Civil)	CMD	6
20	Krishna Mohan	Junior Engineer (Electrical)	CMD	6
21	M Yedukondalu	Executive Assistant	CMD	6
22	Naveed MA	Executive Assistant	CMD	6
23	Nelli Avas	Junior Engineer (Civil)	CMD	6
24	Rajana Sravanakumar	Junior Engineer(Electrical)	CMD	6
25	T Srinivas	Executive Assistant	CMD	6
26	Tata Babuji	Junior Engineer(Electrical)	CMD	6
27	Viyuri Raja Babu	Junior Engineer (Civil)	CMD	6
28	Narla Kalyan Kumar	Senior Assistant	CMD	5
29	Uppuleti Chandramouli	Accountant	CMD	4
30	Jakka Jagadish Kumar	Junior Technician (Civil Supervisor)	CMD	3
31	K Arun Kumar	Junior Technician (Ele)	CMD	3

31	K Arun Kumar	Junior Technician (Ele)	CMD	3
32	Muthyala Satheesh	Junior Technician (Civil Supervisor)	CMD	3
33	B Rajander	MSA II	CMD	2
34	Chakali Papaiah	MSA II	CMD	2
35	Begari Vinod	MSA I	CMD	1
36	Bhoopal K	MSA I	CMD	1
37	Chintala Satish	MSA I	CMD	1
38	Nenavath Shiva Shankar	MSA I	CMD	1
Computer Centre				
1	Imtiaz Ahmed	Technical Officer	Computer Centre	10
2	Karn Choudhary	Technical Superintendent	Computer Centre	8
3	M Anil Kumar Reddy	Technical Superintendent	Computer Centre	8
4	Sanju Kumar Chavan S	Technical Superintendent	Computer Centre	8
5	Bollavaram Harshavardan Reddy	MSA I	Computer Centre	1
6	Shaik Sameer Ahmed	MSA I	Computer Centre	1
Counselling Cell				
1	Maria Josephine Susan Morris	Sr Psychological Counselor	Counselling Cell	10
2	D Phani Bhushan	Jr. Psychological Councillor	Counselling Cell	8
3	Yukti Rastogi	Psychological Counselor	Counselling Cell	8
CSE				
1	Bondla Jessy	Technical Superintendent	CSE	8
2	K Raguraman	Technical Superintendent	CSE	8
3	Nakka Syamala Rao	Technical Superintendent	CSE	8
4	T Vijay Chakravarthi	Technical Superintendent	CSE	8
5	Ponna Satyanarayana	Executive Assistant	CSE & CC	6
6	Maloth Sunitha	Junior Technician	CSE	3
7	Nikith Reddy Peddasherri	Junior Technician	CSE	3
Design				
1	Kumawat Vijay Prakashchand	Technical Superintendent	Design	8
2	Rajkumar B	Technical Superintendent	Design	8
3	B Vivekananda chary	Technician	Design	4
4	Raj Priyadarshan Jee B	Junior Technician	Design	3
Director office				
1	Saikiran K	Assistant Registrar	Director office	10
2	A Srinivas Rao	Executive Assistant	Director office	6
3	Gogula S L Vanama Raju	Executive Assistant	Director office	6
Electrical Engineering				
1	Chinmaya Panda	Technical Officer Grade I	Electrical Engineering	10
2	R Thirumurugan	Technical Officer Grade I	Electrical Engineering	10
3	Satheesh K Telagamsetti	Technical Officer Grade I	Electrical Engineering	10
4	Aldhandi Suresh	Technical Superintendent	Electrical Engineering	8
5	Rajasekhar Jala	Technical Superintendent	Electrical Engineering	8
6	Simhadri Hari Prasad	Technical Superintendent	Electrical Engineering	8
7	Suchismita Banerjee	Executive Assistant	Electrical Engineering	6
8	Kodavandlapalle N Rasool	Technician	Electrical Engineering	4
9	S Velmurugan	Technician	Electrical Engineering	4
10	Santu Kayal	Technician	Electrical Engineering	4
11	Manikanta PLG	Junior Technician	Electrical Engineering	3
12	Nagaraju Naddi	Junior Technician	Electrical Engineering	3
13	Anup Kumar Shahi	Junior Technician	Electrical Engineering	3

14	Tirumani Vamshi Krishna	Junior Technician	Electrical Engineering	3
15	Palpanuri Madhu	MSA II	ES,CC&AI	2
Finance & Accounts				
1	Jagadeswara Rao B	Deputy Registrar	Finance & Accounts	12
2	Manchambhotla Phanindra Kumar	Assistant Registrar	Finance & Accounts	10
3	V S P Hanumantha Krishna	Assistant Registrar	Finance & Accounts	10
4	Bala Prakash T	Section Officer	Finance & Accounts	8
5	Syed Sadique Ali	Section Officer	Finance & Accounts	8
6	Anapa Krishna Prasad	Executive Assistant	Finance & Accounts	6
7	Sandolla Dasharath	Executive Assistant	Finance & Accounts	6
8	Racha Praveen	Senior Assistant	Finance & Accounts	5
9	Narla Kalyan Kumar	Senior Assistant	Finance & Accounts	5
9	Attaluri Jeevani	Accountant	Finance & Accounts	4
10	Dodde Tarun Sagar	Accountant	Finance & Accounts	4
11	G Vasantha Kumari	Accountant	Finance & Accounts	4
12	Ramreddy Bharath Reddy	Assistant	Finance & Accounts	4
13	Voleti Gowthami	Accountant	Finance & Accounts	4
14	Chidruppa Thimothi	MSA II	Finance & Accounts	2
GATE & JEE Office				
1	Ankamwar Satish	Executive Assistant	GATE & JEE Office	6
Green Office				
1	Devraj Venkata Subramanyam	AEE(Civil)	Green Office	10
2	Saheli Saha	Junior Engineer (Civil)	Green Office	6
3	Golla Vamsi Krishna	MSA I	Green Office	1
4	Kotamla Srikanth	MSA I	Guest House	1
5	Ramnaresh B	MSA I	Guest House	1
Hindi Cell				
1	Naveen Srivastava	Junior Hindi Translator	Hindi Cell	6
Hostel office				
1	Rajneesh MP	Deputy Registrar	Student's & Internal Audit	12
2	Palle Mohan Kumar	Assistant Registrar	Hostel office	10
3	Mohsin Mohammed	Section Officer	Hostel office	8
4	Sady Sarala	Section Officer	Hostel office	8
5	George K T	HMA	Hostel office	6
6	Nandyala Bheemeswara Reddy	Executive Assistant	Hostel Office	6
7	Razia Begum	Senior Assistant	Hostel office	5
8	Gandepalli Surya Prakash	Assistant	Hostel office	4
9	B Vinod Kumar Raju	Junior Assistant	Hostel office	3
10	L Dinesh	Junior Assistant	Hostel Office	3
11	A Pushpalatha	MSA II	Hostel office	2
12	Batti Raja Sekhar	MSA I	Hostel Office	1
13	Ch Guru Prasad	MSA I	Hostel Office	1
14	S Swapna	MSA I	Hostel office	1
HR Section				
1	Syed Ali Sabeer	Deputy Registrar	HR Section	12
2	Laxman Srigiri	Assistant Registrar	HR Section	10
3	Vayuvegula Surya Phani Kumari	Assistant Registrar	HR Section	10
4	S V Sree Devi	Section Officer	HR Section	8
5	Naresh Kandrathi	Executive Assistant	HR Section	6

6	Venkanna Bolagani	Executive Assistant	HR Section	6
7	Debarpita Parira	Assistant	HR Section	4
8	G Shyamala Kumari	Assistant	HR Section	4
9	K Satheesh	Assistant	HR Section	4
10	M Ramakesava	Junior Assistant	HR Section	3
11	Bhalerao Ganesh Dnyaneshwar	MSA I	HR Section	1
Internal Audit				
1	G Vijay Kumar	Senior Assistant	Internal Audit	5
2	Lakkoji Manikanta	MSA I	Internal Audit	1
Liberal Arts & Design				
1	Abani Kumar Das	Executive Assistant	Liberal Arts & Design	6
2	Anjaneyulu Botta	Junior Technician	Liberal Arts	3
3	Chintha Anjali	MSA I	Liberal Arts & Design	1
Library				
1	Dr Bhojaraju Gunjal	Chief Library Officer	Library	13
2	C Mallikarjuna	Deputy Librarian	Library	12
3	Kimidi Siva Shankar	Assistant Librarian	Library	11
4	Haseena V K K M	Library Information Assistant	Library	6
5	Jayanta Kumar Sahu	Library Information Assistant	Library	6
MAE				
1	Raju P	Technical Officer Grade I	MAE	10
2	Ramu G	Technical Officer Grade I	MAE	10
3	Vootla Srikanth	Technical Officer Grade I	MAE	10
4	Ajith A	Technical Superintendent	MAE	8
5	Pandicheri Madhu	Technical Superintendent	MAE	8
6	Vallakonda Santhosh kumar	Executive Assistant	MAE	6
7	Mohd. Abdulla	Technician	MAE	4
8	S Jagadeesan	Technician	MAE	4
9	Marepally Praveen Kumar	Junior Technician	MAE	3
10	Pillai Madhushankar Subramonia	Junior Technician	MAE	3
11	Rekhala Vikram	Junior Technician	MAE	3
Mathematics & Physics				
1	Anand V	Technical Superintendent	Mathematics	8
2	D Sri Hari	Assistant	Mathematics & Physics	4
3	Maatla Vishal	MSA I	Mathematics & Physics	1
MS Section				
1	Muniganti Badrinath	Joint Registrar	MS Section	13
2	Md Jameel	Assistant Registrar	MS Section	10
3	T Vijay Anand	Section Officer	MS Section	8
4	Dhananjay K	HMA	MS Section	6
5	N Pradeep Kumar	Executive Assistant	MS Section	6
6	Nalla Srinivas	Executive Assistant	MS Section	6
7	Guntur Vimala	MSA II	MS Section	2
8	M Sandeep	MSA II	MS Section	2
9	Muthyalu Kumar	MSA II	MS Section	2
10	P Srinivas	MSA II	MS Section	2
11	Md. Faheem Khan	MSA I	MS Section	1
MSME				
1	B Balavandhi Raju	Technical Officer Grade I	MSME	10
2	Upender Sunkari	Technical Officer Grade I	MSME	10

3	Mohammad Abdul Junaid	Technical Superintendent	MSME	8
4	Muriki Laxminarayana	Technical Superintendent	MSME	8
5	Yarajani Sravani	Technical Superintendent	MSME	8
6	E Rangaiah	Technician	MSME	4
7	Manche Venkata Srinivas	Technician	MSME	4
8	Asutya Kumar Biswal	Junior Technician	MSME	3
9	E R Jothilingam	Junior Technician	MSME	3
10	Nalam Divakar	Junior Technician	MSME	3
11	Saimatha Gannabathula	Junior Technician	MSME	3
Entrepreneurship and Management				
1	Kalinga Chandra Mohan	MSA I	EM	1
International And Alumni Relations				
1	A Pranitha	Section Officer	Office of IR	
2	Azmath Ali SK	Executive Assistant	Office of AR	6
3	Akarapu Chittaranjan	MSA I	Office of AR	1
PCR				
1	Lingampally Neeraja	Executive Assistant	PCR	6
2	Lalit Kishor Sharma	MSA I	PCR	1
Physics				
1	T Naaraayanan	Technical Officer Grade I	Physics	10
2	Kanchugantla Rameshyadav	Technical Superintendent	Physics	8
3	Ranjit Kumar	Technical Superintendent	Physics	8
4	T Chengappa	Technical Superintendent	Physics	8
5	D Sri Hari	Assistant	Physics	4
6	Karthik Bhat	Junior Technician	Physics	3
7	Samaresh Basani	Junior Technician	Physics	3
8	Shivaram Lakum	Junior Technician	Physics	3
9	Vadla Anjaiah	Junior Technician	Physics	3
10	Vasudevarao Pavuluri	Junior Technician	Physics	3
11	Maatla Vishal	Multi Skill Assistant Gr.I (General)	Physics	1
Placement Cell /OCS				
1	K Malini	Section Officer	Placement Cell /OCS	8
2	Vetrivel M	Executive Assistant	Placement Cell /OCS	6
Security Office				
1	M Sreejith	Chief Security Officer	Security Office	13
2	Pyaram Purushotham	Security Officer	Security Office	11
3	Prasad Boppa	MSA I	Security Office	1
Sports Department				
1	Baba Aditya Varma P	Sports Officer Grade-I	Sports Department	10
2	Hardeep	Sports Officer Grade-I	Sports Department	10
3	Md. Akbar	Sports Officer Grade-I	Sports Department	10
4	Ruchi Yadav	Sports Officer Grade-I	Sports Department	10
5	Vikram Pratap Singh Bundela	Sports Officer Grade-I	Sports Department	10
6	Anil Kumar Kushwaha	Physical Training Instructor	Sports Department	6
7	Kherkar Purva Ganeshrao	Lady PTI	Sports Department	6
8	Mallikarjun	Physical Training Instructor	Sports Department	6

SRC/R&D Section				
1	Gajula Ashok	Deputy Registrar	SRC/R&D Section	11
2	M Eswar Reddy	Assistant Registrar	SRC/R&D Section	10
3	N Srisailam	Assistant Registrar	SRC/R&D Section	10
4	Mahaboob Moonavath	Executive Assistant	SRC/R&D Section	6
5	K Shiva	Senior Assistant	SRC/R&D Section	5
6	Mohd. Mirza Raza Ali Baig	Senior Assistant	SRC/R&D Section	5
7	E Guruswamy	Accountant	SRC/R&D Section	4
8	Gollapalli Nagesh	Accountant	SRC/R&D Section	4
9	Narayana Ramanjaneyulu	Accountant	SRC/R&D Section	4
10	Pradeep Kumar Jada	MSA I	SRC/R&D Section	1
Stores & Purchase				
1	Doddi Chanchala Devi	Deputy Registrar	Stores & Purchase	12
2	K Ramesh Kumar	Assistant Registrar	Stores & Purchase	10
3	Suresh Narayanan Nair	Assistant Registrar	Stores & Purchase	10
4	Potharlanka Sree Ramakrishna	Section Officer	Stores & Purchase	8
5	Dinakar Pyla	Executive Assistant	Stores & Purchase	6
6	Sankarreddy A	Executive Assistant	Stores & Purchase	6
7	Sonawane Gunavant Narayan	Executive Assistant	Stores & Purchase	6
8	Vijaya Lakshmi A	Executive Assistant	Stores & Purchase	6
9	N Aruna	Assistant	Stores & Purchase	4
10	N Shivakumar	Assistant	Stores & Purchase	4
11	S Thirunavukkarasu	Junior Assistant	Stores & Purchase	3
12	Arun Kumar Chidrupa	MSA II	Stores & Purchase	2



భారతీయ సాంకేతిక విజ్ఞాన సంస్థ హైదరాబాద్
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