We are happy to bring out the second issue of IRD Connect (Aug-Nov. 2020). Since the last published Newsletter, both the Institute and IRD Unit have taken up various activities in diverse areas of science and technology, which are included in the current issue.

Starting with the current issue, we will regularly cover the institute’s research landscape, adopting a department-wise approach. The first department chosen is the Department of Applied Mechanics. We feel happy to announce that the department is running 19 sponsored research projects worth INR 20.54 Cr, out of which five projects have received a grant of more than INR 1Cr. Congratulations to Team AM!

We are also initiating coverage on significant research outcomes, industrial patents, start-ups, and technology transfers emerging out of sponsored research implemented by faculty members through IRD.

I wrap up by wishing you all a Happy 2021!

Professor Sunil Khare
Dean (R&D)
Starting with the current issue, we will regularly cover the research landscape of the institute; adopting a department wise approach. The first department chosen is Department of Applied Mechanics. We feel happy to announce that the department is running 19 sponsored research projects worth INR 20.54 Cr, out of which five projects have received a grant of more than INR 1Cr. Congratulations to Team AM!

Department of Applied Mechanics
The department of Applied Mechanics was set up in IIT Delhi in the early sixties to teach the fundamental courses in Engineering Mechanics across the departments and pursue research and industrial consultancy in the areas of Engineering Mechanics and Product Design. The main focus is to disseminate the fundamental principles of Solid and Fluid Mechanics and implement these fundamental concepts to tackle real-life problems by using analytical, computational, and experimental methods. The department follows these principles and practices in various teaching and research areas. These are constitutive modeling, impact & nonlinear mechanics, nano-mechanics, bio-mechanics, and AI in mechanics. Moreover, it covers off-shore structures, flow metering, laminar & turbulent flows, industrial and compressible aerodynamics. Over the last five decades, specialized laboratories have been developed to a high degree of sophistication, especially in the broad areas of Solid Mechanics, Fluid Mechanics, and Computations. The department runs two post-graduate programmes, namely M. Tech. (Engineering Analysis and Design) and D.I.I.T. (Naval Construction).

The Ph.D. programme of the department offers research opportunities in the above areas. The department has recently started a popular four year B. Tech. Program in Engineering and Computational Mechanics. The department also offers several B. Tech. courses in Engineering Mechanics, Computational Mechanics, and Experimental Methods to undergraduate students of different engineering disciplines.

The department has also prioritized the development of the following areas for the next five years through induction of new faculty members as well as infrastructure development:

- Bio-mechanics & soft materials
- Engineering & scientific computing
- Mechanics of multi-functional materials & structures
- Design & engineering of light-weight structural materials
- Turbulent convection, dispersion, & other transport processes

A large number of sponsored research projects funded by the Government as well as private agencies/departments are currently in progress. The faculties of the department are also involved in several international collaborative & mission projects.
Memorandum of Undertaking (MoUs)

Indian Institute of Technology (IIT) Delhi & Institute of Liver and Biliary Sciences (ILBS), Delhi have signed an MoU to establish 'ILBS-IITD Collaborative Platform' initiating wide-ranging collaborations involving:

1. Use of Artificial Intelligence in Liver & Biliary diseases.
2. Bio-sensor development
3. Computational biology and Big Data.
4. Material Sciences, Liver Dialysis Membranes and Machines
5. 3D Bio-printing, Bio-artificial Liver
6. Processes such as regenerative tissue growth
7. Use of nano-science in diagnosis and effective drug delivery
8. Applied principles and design concepts of engineering to healthcare &
9. Establishment of an Incubation Center at ILBS, with the help of FITT (IIT Delhi).

At the outset, an MFRP call for IITD-ILBS faculty members is being initiated under the MoU.

MoU signed with Odisha University of Agriculture & Technology (OUAT), Bhubaneswar

IIT Delhi and OUAT, Bhubaneswar signed an MoU for strengthening research & education in cutting edge areas of agriculture and allied subjects on 12th August 2020. The partnership will find solutions for farmers' problems in agriculture using technologies such as Precision farming, Nanotechnology, Geo-spatial technology, and Biotechnology. The MoU was signed by Prof. V. Ramgopal Rao, Director, IIT Delhi, and Dr. Pawan Kumar Agrawal, Vice-Chancellor, OUAT, Bhubaneswar.

MoU signed with M/s Mastercard Technology Private Ltd

Indian Institute of Technology (IIT) Delhi and M/s Mastercard Technology Private Ltd., Pune have signed an MoU on 3rd September 2020 for research engagement in the area of Artificial Intelligence, Cyber Security, Data. Science & Analytics, etc., towards Payment Technology aspects academic, research, product, process, & human resource development. The MoU was signed by Prof V. Ramgopal Rao, Director, IIT Delhi, & Dr. S K Sarin, Director, ILBS, Delhi.

Centre of Excellence (CoE)

IIT Delhi & DAKSH Society Bengaluru sign MoU to establish DAKSH Centre of Excellence for Law & Technology

Indian Institute of Technology (IIT) Delhi & DAKSH Society, Bengaluru, signed an MoU to establish the DAKSH Centre of Excellence (CoE) for Law & Technology at IIT Delhi. Prof V. Ramgopal Rao, Director, IIT Delhi, & Shri Surya Prakash BS, Programme Director, DAKSH Society, Bengaluru, signed the MoU. Both the institutions have agreed to collaborate while recognizing each other's strengths in research and education and mutual interests in Technology, Engineering, Management, & Law.

Centre of Excellence (CoE) – Personal Body Armour

The CoE on Personal Body Armour was inaugurated by Dr. G. Satheesh Reddy, Secretary DDR&D and Chairman, DRDO in the presence of Prof V. Ramgopal Rao, Director IIT, Delhi on 21st Oct 2020. The creation of the CoE has been at the behest of NITI Aayog under the initiative of PMO for “Make in India – Personal Body Armour.” This is a culmination of a joint research initiative of DRDO & IIT Delhi. This CoE will serve as a point of convergence of the user requirements (Armed forces/Home land security forces) and the scientists engaged in the development of light weight personal body armour solutions.
For Students
IIT Delhi-IRD organized Students I4 Challenge Awards
Through IRD Unit, the institute organized Ideation at Isolation; Implementation at Institution’(I4) Challenge for students, amid suspension of academic activities due to COVID-19. The students (UG, PG & Doctoral) were invited to participate in the I4 Challenge’, which required them to find innovative solutions to challenges in topical areas. The IITD faculty members across various disciplines floated a total of 28 challenges/problems. About 100 students/teams participated and submitted their innovative solutions. The solutions were evaluated by the challenging faculty member, who recommended the best solution for the challenge.

These best solutions were further assessed by experts in respective areas (excluding the challenger) for selecting the five best solutions. The details can be accessed at

http://ird.iitd.ac.in/content/evaluation-results-students-i4-challenge-ideation-isolation-implementation-institution.

A Certification of Appreciation and cash award will be given to the student(s) recommended for the best solution. All participating students are encouraged to apply for the IRD student start-up Action and Discover & Learn (1-2-3-4) schemes call 2020.

For Faculty Members
Grand Challenges Initiative (GCI) for the Department of Humanities & Social Sciences
Under this initiative, eight projects have been sanctioned through a competitive & peer-reviewed model of financial support. Each project proposal will receive an amount up to INR 50 lakh for a five-year duration. This initiative aims to initiate interdisciplinary research activities between faculty members of the institute’s Department of Humanities & Social Sciences and Sciences & Engineering Departments. More than 15 faculty members from other Departments/Schools/Centres are collaborating with Humanities & Social Sciences faculty under this initiative.

Institute Webinars Series
- Prof. Manidipa Banerjee, Associate Professor, KSBS, IIT Delhi, presented a webinar on "SARS-CoV-2 Virus-like particles as potential vaccine candidates and model systems for virus assembly" on 21st August 2020.

- Prof. Shashank Deep from Dept. of Chemistry, IIT Delhi, presented a webinar on "EGCG from Green Tea and With a ferin from Aswagandha as a Potential Inhibitor of SARS-CoV-2 Main Protease" on 13th November 2020.
University College London (UCL) - IIT Delhi Joint Webinar Series held in Sept 2020

A successful IITD-UCL joint webinar series (15th to 23rd September 2020) was held by the students & researchers from IITD and those from other Institutes & Universities of India & abroad. The welcome note was addressed by Prof Monica Lakhanpaul (Vice-Provost South Asia, UCL) and Prof. Sunil Khare (Dean R&D, IITD). The inauguration of the series was done by Prof. Ashok Kumar Ganguli (DDS&P, IITD) & Prof. Rebecca Shipley (Director, Institute of Healthcare Engineering, UCL).

In the joint webinar series, eminent researchers from IITD & UCL shared their research in the six key research themes including Assistive Technology, Robotics, PPE, Diagnostics, AI for healthcare, Imaging & Impact of Assistive Technology on the International Collaboration in Disability Innovation.

UCL-IITD MFIRP Call-2020
The second Call for UCL & IITD, joint collaborative research project proposals, was announced in all the research areas including Antimicrobial Resistance, Artificial Intelligence, Advanced Materials, Cyber Security, Global Health, Healthcare Engineering, Human-centric Design, Humanities, and Social Sciences, Imaging, Nanobiotechnology, Robotics, Sustainable Environment and Urban regeneration and development with the last date of proposal submission on 13th November 2020. Currently, the proposals are undergoing the review and evaluation process.

All India Institute of Ayurveda and -IITD MFIRP Call-2020
Seven AIIA-IITD MFIRP proposals were evaluated by a team of external experts from Ayurveda Institutions and AIIMS Based on the experts’ recommendations, it was decided to support all the seven project proposals with the seed fund of INR 10 Lakh for two years from both AIIA & IITD Projects will be operational after Ethical Clearance from AIIA and Biosafety Clearance from IITD.
RESEARCH OUTCOMES FROM SPONSORED PROJECTS

**Publications**
Some significant publications out of the R&D projects were received by the unit during this period. The detailed list is available on IRD unit's website.

**Patents out of Sponsored Research Projects during Aug-Nov 2020**
1. Wireless Information and Energy Transfer using Distributed Beamforming, Dr. Swadesh Dey, Dr. Smriti Sachdev, EE.
2. New dynamic yam pull-out tester for high-performance fabrics, Dr. Abhijit Majumdar, TT.
3. A Three-Phase Grid Integrated Multiple Solar PV Arrays-Battery Based Microgrid, Dr. Bhim Singh, EE.
4. Energy-efficient Receiver-initiated Wireless Information and Energy Transfer using Distributed Beamforming, Dr. Swadesh De, EE.
5. Tension adjustment mechanism for tendon driven systems, Dr. J.P. Khatait, ME.
6. A control system for continuous bioprocessing using surge tanks, Dr. Anurag S. Rathore, Chemical.
7. Versatile solar cooking system with cascade thermal energy storage for household & community level cooking, Dr. K Ravi Kumar, CES.
8. Novel Remote Centre-of-motion (RCM) Adjustment for Medical/Surgical Device, Dr. Jitendra Prasad Khatait, ME.
9. An automated quantitative instrument and microfluidic chip for carrying out rapid detection of pathogens, Dr. Sandeep Jha, CBME.
10. Optimal building energy management system optimal building energy management system, Dr. Ashu Verma, CES.
11. A three phase grid tied bidirectional synchronous reluctance motor based solar photovoltaic water pumping system, Dr. Bhim Singh, EE.
12. Single polymer Towpreg System through electrostatic powder spray coating process, Dr. A Ramasamy, TT.
13. A visualization based tool for comparing Instruction set Architectures (Isas), Dr. Smruti Ranjan Sarangi, CSE.
14. Design of Surface Enhanced Raman Spectroscopy (SERS) Substrate for detection of explosives in trace quantity, Dr. Satish Dubey, SENSE.
15. A process for viscosity reduction of heavy crude oil without affecting the calorific value of fuel, Dr. Preeti Srivastava, D.B.E.B.
16. High Performance spray coated nonwoven air filtration media, Dr. Dipayan Das, TT.
17. Low speed predictive torque and amp; flux control of a three-phase induction motor drive from a single phase supply using single-phase to three-phase matrix converter, Dr. Bhim Singh, EE.
18. Multi-functional three-phase single stage solar PV-BES based Microgrid with seamless transfer capability between utility grid and diesel generator, Dr. Bhim Singh, EE.
19. Fiber orientation gradient fibrous air filter, Dr. Dipayan Das, TT.
20. Triple Shield, portable, universal biological green decontamination station, Dr. B.S Butola, TT.
22. Setup & Method for Non-Invasive blood glucose concentration measurement using transmission and reflection properties of millimeter wave, Dr. Shiban Kishen Koul, CARE.
23. Substrate Integrated Waveguide variable phase shifter, Dr. Shiban Kishen Koul, CARE.

*The patent filing list given above is not exhaustive, it is just indicative in nature.*
Start-ups Setup as Outcome of the Faculty Research during Aug-Nov 2020

1. Sparsemind Technology Labs Pvt. Ltd.- Dr. Jayadeva of the Department of Electrical Engineering IIT Delhi is one of the company’s Founder-Director.
4. Accord Innovations Pvt. Ltd.- Prof. Dr. Amit Mehndiratta, Centre for Biomedical Engineering.

Sponsored Projects & Consultancies (1-8-2020 to 22-11-2020)
A total of 252 sponsored projects and consultancies worth INR 9337.50 Lac were sanctioned during the referred period.

High Value Sponsored Projects
Sanctioned during the period 1-8-2020 to 22-11-2020 with value INR 50 Lacs and above
1. Daksh Centre of Excellence (CoE) for Law & Technology, PI- Prof. Nomesh Bhojkumar Bolia
2. Material characterization of brain tissue & development of tissue-device interaction-based neurosurgical simulation tool, PI- Prof. Sitikantha Roy
3. RE(Pd/Pt)Bi Thin films: A Multi-functional Experimental Platform for exploring Topological Quantum phenomena & Magnetism, PI- Prof. Ratanamala Chatterjee
4. Establishment of Centre of Excellence under Industry Alliance on Artificial Intelligence, PI- Prof. Niladri Chatterjee
5. Establishment and application of an AQM model for the Indo-Gangetic Okain (IGP-AQMmod), PI- Prof. Sagnik Dey
6. Development of functional admixtures for application to sustainable cements, PI- Prof. Shashank Bishnoi
7. Pilot Study for Assessment of Reducing Air Pollution in Urban Area by Using Medium Scale Cleaning System (Joint project with IIT Bombay & IIT Delhi), PI- Prof. Sri Harsha Kota

IRD Procedures Rule Book for Operation of Projects & Consultancies
An information booklet “Rules & Procedures for (Manual) IRD Operations” is available on IRD unit’s website.
NEW FUNCTIONALITIES PROVIDED IN IRIS

IRD Schemes
IRD Schemes for faculty and students have been made available under the new Menu Tab "IRD Schemes" in IRIS.

SoE/UC
SoE request submission link is now available under SoE/UC menu tab.

PDF
Expenditure from the PDF submission link is now available under the menu tab PDF.

Newly Added Features
Provision to track bills submitted to IRD.

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"The IRD Unit sends its best wishes to all the Faculty, Staff members, and Students for the year 2021."
"It is strange that only extraordinary men make discoveries, which later appear so easy and simple."

- Georg C. Lichtenberg