



# IRD CONNECT

## INDUSTRIAL RESEARCH AND DEVELOPMENT (IRD)

# NEWSLETTER

DECEMBER 2020 – MARCH 2021



# MESSAGE FROM THE DIRECTOR



After months of COVID caused disruptions at the institute, IIT Delhi researchers have now returned to labs, and work on research projects has regained momentum. The IRD Unit has operationalized the Delhi Cluster: Delhi Research Implementation and Innovation (DRII) scheme sanctioned by the Office of the Principal Scientific Adviser, Govt. of India for multiple projects tenable for three years under five themes - solid waste management, air pollution, sustainable mobility, water security, and artificial intelligence and machine learning for health care.

Among the other long-term schemes implemented recently by the FITT IRD is the Faculty Innovation and Research-driven Entrepreneurship (FIRE) with a funding of INR 50 lakh with special leave provisions and other facilitation from the Institute. This scheme will enable entrepreneurship through deep tech innovation among our faculty at the Institute.

Additionally, the IRD Unit organized webinars for the benefit of PIs and researchers with a focus on research funding by the Department of Biotechnology (DBT), Indo-German Science and Technology Centre (IGSTC), Gurugram, and by the Technology Development Board, Department of Science and Technology (DST). The webinars were well received by the audience.

IRD signed multiple Memoranda of Understanding (MoUs) during this period. An MoU was signed with the Indian Navy to empower IIT Delhi researchers in nation-building through research in strategic defence technologies. Another MoU was signed with The Hebrew University of Jerusalem, Israel intending to strengthen the Institute's research capabilities in areas of Computer Science, Biomedical Science, Environment and Chemistry.

Best wishes,

---

**Professor V. Ramgopal Rao**  
**Director,**  
**Indian Institute of Technology Delhi**

# SCIENCE AND ENGINEERING RESEARCH IN 2020



Novel Coronavirus paused the whole globe and brought a conspicuous change in global research priorities in 2020. While most of the scientific activities slowed down during this period, research tackling Covid related challenges took a front seat. Globally, researchers came together & worked on understanding SARSXX's genome and proteins, development of numerous test protocols, and most significantly, development of vaccine for the virus.

IIT Delhi's faculty has been on the forefront of some of the most significant research related to COVID that are highlighted here: <https://home.iitd.ac.in/covid19-research.php>. For instance, thanks to the efforts of Prof. Viveknandan Perumal of KSBS and his team, IIT Delhi developed COROSURE, a probe-free RT-PCR based kit for detecting SARCoV2. COROSURE is the cheapest kit of its kind in the market, approved by the Drug Control General of India and the Indian Medical Council.

Thanks to the visionary efforts of the Director and our administration, IIT Delhi developed a doorstep COVID-19 testing centre facility within the campus. This not only provided great ease for campus community but also demonstrated the scientific and engineering capabilities of our faculty and students.

Some other global landmark research developments in this period have been (i) CRISPR-Cas9 technology applied in humans for modifying gene causing blindness (ii) super enzymes development, a magical boom for plastic degradation. (iii) Deepmind's AI technology called AlphaFold to ensure effective tailored drug (iv) lab-grown meat and (v) development of a living robot for NASA's Mars Exploration Program.

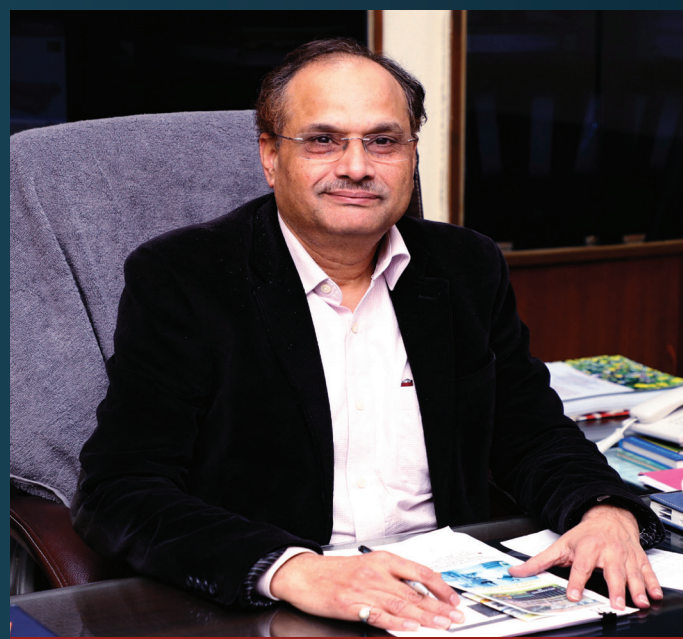
IIT Delhi witnessed a steep rise in the number of patents filed from 1 patent for every ~50 papers in 2016 to ~2 patents for every 17 papers in 2020. Despite the pandemic outbreak, we contributed 153 patents in 2020. The startups incubated at IIT Delhi also rose by 5x, successfully breaking the boundaries of Covid-19 constraints.

Despite all the challenges 2020 threw at us, it has been an encouraging year overall. With renewed vigor, we look forward to an even more productive 2021 for Science and Engineering Research at IITD.

**Prof Sunil K Khare**  
Dean (R&D)

# RESEARCH LANDSCAPE FROM THE DEPARTMENTS

The department has established strong interactions with leading Indian and multi-national companies through sponsored research and consultancy projects. It is equipped with the state-of-the-art experimental and computation facilities to pursue cutting-edge research. The Department of Chemical Engineering at IIT Delhi has a strong industry connect and surpasses our peers at all other IITs in this aspect. It is my pleasure to announce that we registered a steady increase in funding from industry. ChE faculty pioneered 56 companies during this period via 80 projects worth 125 Cr. More than 10 projects have received grants exceeding INR 1Cr. I congratulate complete team of ChE department for their paramount efforts and appreciate their endeavours for consistent growth.



**Prof K. K. Pant, HOD**  
Chemical Engineering, IIT Delhi

## Department of Chemical Engineering

Chemical engineering at IITD is a 60-year-old vibrant department casting its footprints in new frontier areas of materials, renewable energy, waste to wealth, biopharmaceuticals, nanoscale materials, and computational research. It is uniquely placed to drive research in many areas relevant to society such as climate, green chemicals, clean energy, medicine, and consumer goods. It establishes natural synergy with many other prominent academic units in IIT Delhi. The ChE faculties are actively involved in about one-third of the CoEs presently running on campus. This wide spectrum of faculty interests bridging fundamental aspects of science to value-added technology research, and the very nature of the chemical engineering discipline, renders ChE-IITD a truly special department on campus. We aim to develop a state-of-the-art multi-disciplinary fabrication and characterization facility called 'Micro-engineered device facility' to facilitate the design, fabrication, characterization, and conduction of

experiments with microfluidic devices. Applications pervade from classical catalyst design to novel materials, providing solutions for clean energy, chemicals, green environment, energy devices, etc. The impact of research depends on the quality of new knowledge based on fundamental mechanistic analysis and on the pace of delivering new technologies to industry. The Department runs 4 Post-graduate programmes (MTech, MS(R), Dual-degree, PhD) and 1 Undergraduate (BTech). Over the last 5 years, we have increased our Ph.D. strength by 400% and our current graduating student ratio per faculty per year stands at ~ 0.7. Our total research funding has grown exponentially (approx. 3-fold) to INR 45 crores in FY 2019-2020 yielding a publication record of 3 articles per faculty per year. These major achievements have led our department to become a premier destination for higher education in the country with a current QS world ranking of 67.

The Department expansion goal over the next 5 years is to become one of the top 50 chemical engineering departments globally by 2025. The key drivers to achieve this goal are identified to be

- Exponential growth in human resource with international presence
- State-of-the-art research facilities to accelerate interdisciplinary and translational research
- Newly renovated research spaces with essential safety features
- Highly trained support staff to manage routine administrative duties currently performed by the faculty members.

Over the next 5 years, the department aims to hire 20 new faculty members in different categories (regular, visiting, emeritus, PoP etc.) to propel research in strategic areas to create visibility and further attract new faculty members to join IITD to boost its overall ranking. Additionally, department aims to recruit up to 300 Ph.D. students in steady state to target a healthy 6 PhD students per faculty ratio at any given time. So as to graduate 1 PhD student per faculty every year in this journey, Department plans to ensure greater diversity in the students group with more participation from women and International PhD students.

### Major projects running in Department:

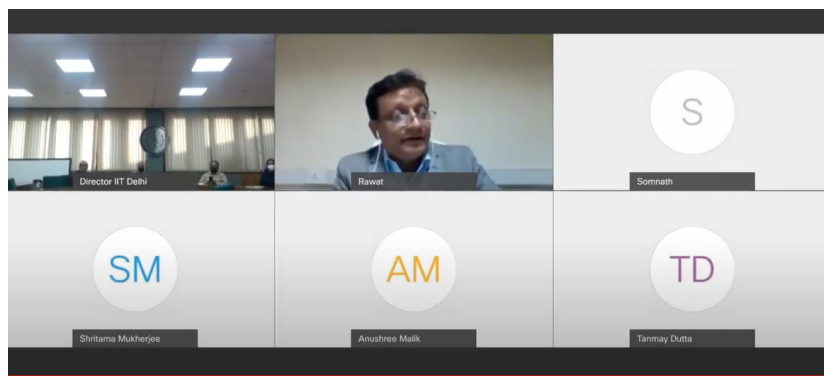
- Coal to methanol 38 Cr, 2019-2021, Thermax
- Agilent Thought Leader Award, 2020-2023, 10 Cr, Agilent Technologies
- Continuous Processing, 2018-2020, 5 Cr, Pall Life Sciences and Biocon
- Process Automation and Control, 5 Cr, 2019-2022, TCS
- Extraction of Metal from E-Waste, 4.3 Cr, 2017-20, DST

With the changing socio-economic landscape, increasing student strength, growing aspirations of faculty and students, and a greater focus of IITD to become a world leader in not only teaching but also research, innovation and technology, the ChE department strongly feels that it is time to take a relook at its own vision for future growth over the next 5 years to achieve excellence aligned with IoE goals. It is noteworthy that the department is engaged in several national mission mode projects,

such as a focus on Continuous Processing in the Biotech Industry, Waste to Wealth, DST-NITI Aayog's mission on coal conversion to methanol, DST-ESPOB consortium on Energy Storage Platform on Batteries (ESPOB), and DST's Mission Innovation initiatives in which there are multiple projects in the department.

**Visit Us: <http://chemical.iitd.ac.in>**

# IRD WEBINAR SERIES

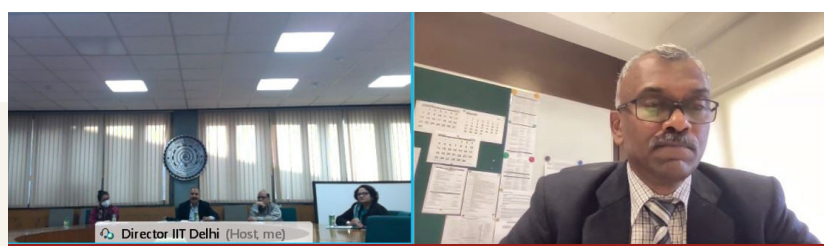


## Schemes and Programmes of the DBT

by Dr. Arun Kumar Rawat, Former Advisor, DBT

The IRD Unit has been inviting senior programme officers from various funding agencies for interactions with faculty members for exposing various schemes and programmes of the agencies, operational issues vis-a-vis expectations from the PI. Under this initiative, a webinar was presented by Dr. Arun Kumar Rawat, Advisor, Department of Biotechnology (DBT), New

Delhi on January 19, 2021. He gave a comprehensive presentation covering multiple research funding schemes and programmes of DBT including that of the Biotechnology Industry Research Assistance Council (BIRAC). The webinar was attended by a wide section of the researcher community in the Institute.

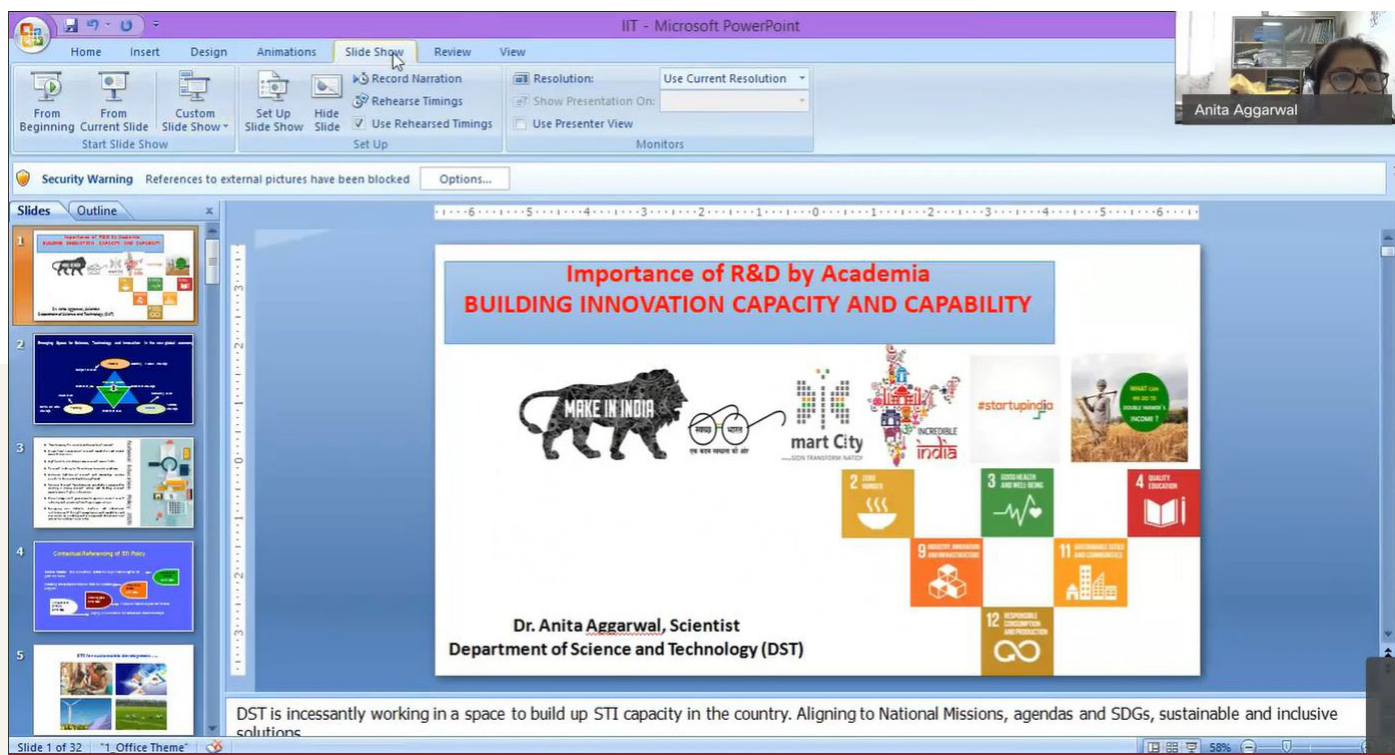


## Schemes and Programmes of IGSTC

by Mr. R Madhan, Director, IGSTC

The second webinar in the series was presented by Mr. R. Madhan, Director, Indo-German Science, and Technology Centre (IGSTC), Gurugram on February 15, 2021. He spoke on the schemes and programmes of IGSTC and the sponsored research activities. A large number of faculty members and researchers

participated in this webinar. Some calls by IGSTC are open throughout the year with two submission cut-off dates in July and Dec each year. The 2+2 model of funding provides up to Euro 4,30,000 to Indian researchers under this research scheme.



## Schemes and Programmes of DST

by Dr. Anita Aggarwal, Scientist-F, DST

The third webinar in the series was presented by Dr. Anita Aggarwal from DST on March 12, 2021. She is a Scientist-F with DST and holds a doctorate in Biochemistry/Immunology. Dr. Aggarwal explained various schemes of the Technology Development Board (TDB) of DST, funding research projects in the

areas of Waste Management Technologies, Advanced Manufacturing Technologies, Science and Heritage Research Initiative, Agro technologies, and Biomedical Devices. Through calls, TDB supports demonstrable prototypes for incubation.

# MEMORANDUM OF UNDERSTANDING



## Regional Centre for Biotechnology (RCB), Faridabad

Indian Institute of Technology (IIT) Delhi and Regional Centre for Biotechnology (RCB) Faridabad signed an MoU in November 2020 to establish “RCB-IITD Collaborative Platform” for initiating wide-ranging collaborations involving academic, research, and human resource development, which will have a substantial social and economic impact for the country.

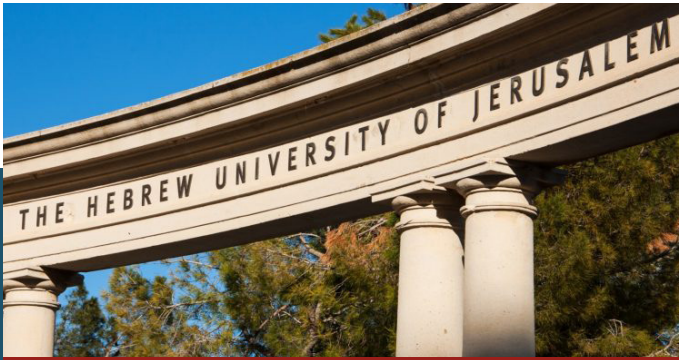
On this occasion, Prof V. Ramgopal Rao, Director, IIT Delhi, said: “IIT Delhi has invested about Rs 300 crores in last 3-4 years to create Advance Central Research facilities on its main campus and Sonapat campus in Haryana. We continue to invest in creating high-end research facilities under which a state-of-the-art Cryo-EM facility will be installed very soon. We invite RCB scientists to come and utilize these facilities at IIT Delhi.” He also invited RCB Faridabad to utilize the incubation facilities available at IIT Delhi.

Despite all the challenges 2020 threw at us, it has been an encouraging year overall. With renewed vigor, we look forward to an even more productive 2021 for Science and Engineering Research at IITD.

## CSC e-Governance Services India Ltd., New Delhi

CSC e-Governance Services India Ltd. is a special purpose vehicle (CSC SPV) incorporated under the Companies Act, 1956 by the Ministry of Electronics & Information Technology. CSC e-Governance Services India Ltd., signed an MoU with the Institute to establish a Design and Innovation Lab at the Institute’s Department of Design in December 2020. As part of the initiative undertaken by IIT Delhi, it will provide the required resources and knowledge in bringing innovations at the grass-root level. The main aim of this partnership is to conduct research activities targeted at enhancing the overall entrepreneurial scope of village dwellers. The entire project has been named as Design and Innovation in VLE’s Indigenous Network Ecosystem (DIVINE).





## The Hebrew University of Jerusalem

Israel

IIT Delhi and the Hebrew University of Jerusalem, Israel (HUJI) signed an MoU in January 2021 to support collaborative and interdisciplinary education and research initiatives. Researchers will get seed funds from their respective institutes besides opportunities for student exchange programmes between both the institutes. On the research front, this MoU will specifically facilitate the use of complementary expertise for joint research projects in cutting-edge areas related to computer science, biomedical science, environment, and chemistry. The HUJI is an internationally renowned and Israel's leading university.

## Indian Navy

New Delhi

Furthering the relationship between the Indian Navy and IIT Delhi on research in the underwater domain of Naval Electronic Systems, an MoU was signed on February 2021. Many Key technologies in the field of underwater electronics have been developed by the Centre for Applied Research in Electronics (CARE) at IIT Delhi. The research carried out at CARE has played an important role in the technological advances made by the Indian Navy. Through this latest MoU, fruitful research in recent areas of strategic importance to the Indian Navy will be carried out jointly by both organisations.



## Ashoka University

Haryana

IIT Delhi and Ashoka University, Haryana signed an MoU for collaborative research and education in the interdisciplinary areas of sciences and social sciences. Through this MoU, both the institutions will carry out joint research by submitting research proposals to external funding agencies, initiate collaborative research, jointly organize seminars, workshops, and/ or short-term courses, exchange of faculty members and students, jointly supervise PhD and post-graduate students. The MoU also has provision for providing administrative support to Ashoka University through the IIT Delhi Sonipat campus and vice-versa.

# PATENTS

At the end of the current financial year, the following is a snapshot of total Intellectual Property Right petitions (IPRs) filed by IIT Delhi faculty and researchers. Out of these, 46 IPRs have been filed in the period December 2020 to March 2021 itself.

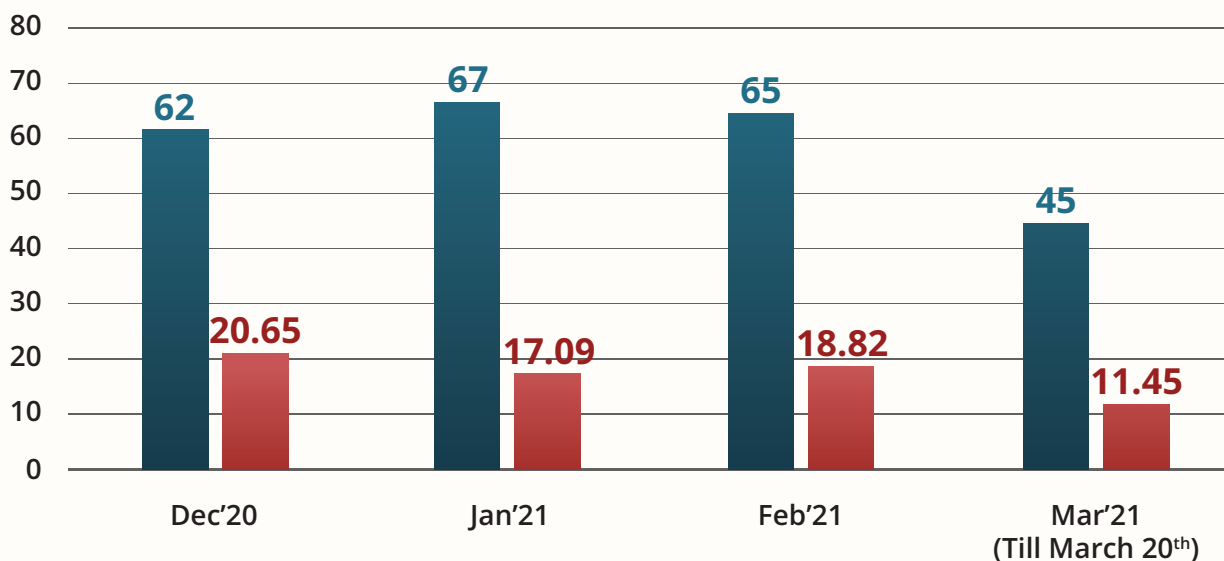
Financial year	No of Patents	No Of Trade-marks	No of Copy-rights	No of Designs	Total IPR
<b>FY 2020-21</b>	<b>138</b>	<b>10</b>	<b>1</b>	<b>4</b>	<b>153</b>

# START-UPS INITIATED DURING THE PERIOD

1. CYRAN AI Solution, Prof. Manan Suri, Department of Electrical Engineering
2. DIV2JS Innovation LLP, Prof. Mukul Sarkar, Department of Electrical Engineering
3. Nanoclean Global Pvt. Ltd., Prof. Ashwini Agarwal, Department of Textile and Fibre Engineering
4. Nanodex Healthcare Pvt. Ltd., Prof. Shalini Gupta, Department of Chemical Engineering
5. ETEX HealthTech, Prof. Bipin Kumar, Department of Textile and Fibre Engineering
6. Integrated suction-irrigation device for microsurgeries, Prof. Devendra Dubey, Department of Mechanical Engineering
7. Protein Stabilizer and Activity Enhancer, Prof. Bishwajit Kundu, Department of Biochemical Engineering and Biotechnology
8. Ekam Eco Solutions Pvt. Ltd., Prof. V M Chahar, Centre for Rural Development and Technology.



# SPONSORED RESEARCH AND CONSULTANCIES



- Number of Sponsored Research Projects & Consultancy Work
- Funding received (in INR Crore)

During a four-month period (Dec 2020–March 2021), IRD Unit has operationalized a total of 239 research projects & consultancies with a sanctioned fund value of INR 68.01 Crore. Out of these, 22 projects received a funding of over INR 50 Lac amounting to INR 33.42 Crore.

## High –Value Sponsored Research Projects (Over INR 1 Cr)

1. **Development of Dental Implants for Advanced and Critical Applications** (Joint project WITH maids- Maulana Azad Institute of Dental Sciences), Prof. Naresh Bhatnagar, Dept. of Mechanical Engineering, Funding Agency-NMITLI, PPD, Council of Scientific & Industrial Research (CSIR), Govt. Of India, (INR 3.43 Cr)
2. **Development of Indigenous Simulation Model for Design and Validation of Traction Power Supply System (ISIMTRAC)**, Funding Agency - High-Speed Railways Innovation Center (HSRIC) Trust (INR 1.43 Cr)
3. **COVID 19 Vaccine Rollout: Institutional Management Partner**, Prof. Sushil, Dept. of Management Studies, Funding Agency- Bill & Melinda Gates Foundation, United States of America, (INR 3.7 Cr)
4. **CSC sponsored design and innovation lab at DoD**, Prof. Jyoti Kumar, Dept. of Design, Funding Agency- CSC e-Governance Services India Limited, New Delhi (INR 1.85 Cr)
5. **Delhi Cluster: Delhi Research Implementation and Innovation (DRIIV)**, Prof. V Ramgopal Rao, Director, IIT Delhi, Funding Agency- Office of the Principal Scientific Adviser, Govt. Of India (INR 9.93 Cr)
6. **Development of Indigenous Simulation Model for Design Validation of OHE Pantograph Interaction**, Prof. Rama Krishna K, Dept. of Mechanical Engineering, Funding Agency- High-Speed Railways Innovation Center (HSRIC) Trust (INR 1.38 Cr)
7. **Improving Crop Dynamics and Land-atmosphere Interaction in the Community Land Model for Major Indian agro-ecosystems**, Prof. Somnath Baidya Roy, Funding Agency - Space Application Centre, ISRO, Govt. Of India (INR 1.08Cr)
8. **Establishment of a Centre of Excellence in the area of Bioinformatics and Computational Biology at IIT Delhi**, Prof. Aditya Mittal, School of Biological Sciences, Funding Agency- Department of Biotechnology, Ministry of Sc.& Technology, Govt. of India (INR 2.14 Cr)



# RESEARCH NEWS



## Joint research projects undertaken with All India Institute of Ayurveda (AIIA)

New Delhi

IIT Delhi and AIIA are jointly working on studying the therapeutic benefits of herbal formulations and wellness. A total of seven collaborative projects are jointly undertaken by the faculty members from both institutes. Under these joint projects, which are tenable for two years, research on therapeutic benefits of herbal formulations and wellness will be carried out and a better understanding is likely to emerge in the following areas:

### The seven collaborative projects focusing on various Ayurvedic formulations and practices include:

1. Effect of the six Ayurvedic rasas (tastes) on gastrointestinal secretions.
2. Develop herbal formulations that would reduce the harmful effects of reusing cooking oil.
3. Develop a biodegradable, herbal wound dressing.
4. Study the effects of the 'Brahmari pranayama' on the nervous system.

5. Analyze the impacts of bhasmas (ashes) on proteins implicated in neurodegenerative diseases.
6. Develop a 'dhoopan-yantra' - a fumigation device for aiding wound healing.

Early cancer detection and assessment of breast cancer response to Ayurvedic drugs is the focus of another project.

Prof. V. Ramgopal Rao, Director, IIT Delhi, while speaking of the collaborative projects between IIT Delhi and AIIA, said, "The amalgamation of traditional knowledge with technology is expected to benefit the society at large by offering better health care options. Validation of the traditional knowledge systems is the key, to make these forms of medicine more widely accepted worldwide. IIT Delhi researchers will be focussing on the validation aspects by working closely with the AIIA faculty."

# IRD NEWS



## Appointments

1. Sh. Mukesh Chand has been posted as AR IRD (A/Cs) w.e.f. 15.01.2021.
2. Sk M.K.Gulati has been posted as Joint Registrar - Coordination Section, of the Institute.

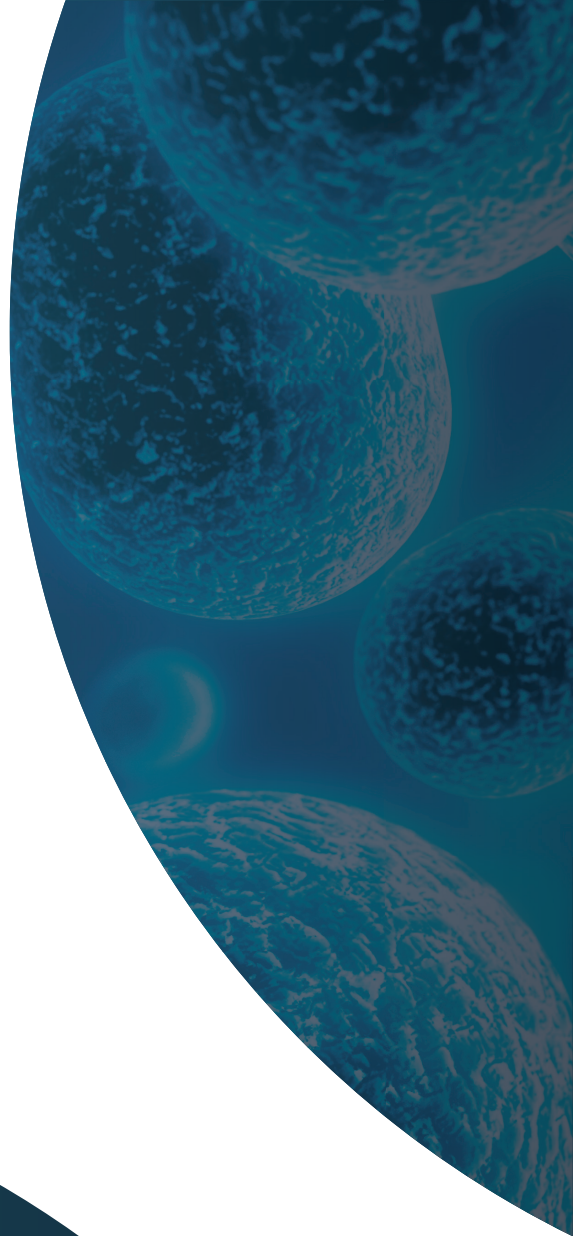
## Superannuation

Sh. Karamveer Singh, Junior Accounts Officer, superannuated after a service of 42 years at the Institute on 31.01.2021. A warm farewell was given to him by the IRD Unit.



“Everything is theoretically impossible, until it is done.”

**Robert A. Heinlein**



IRD IIT Delhi

**IRD IIT Delhi**

FB Page: @IRDIITD

For feedback and queries: deanrnd@admin.iitd.ac.in

---

Published by IRD Unit, IIT Delhi