



SEPTEMBER - DECEMBER 2022

INDUSTRIAL RESEARCH AND DEVELOPMENT

# IRD CONNECT

NEWSLETTER



**DIAMOND JUBILEE YEAR**  
INDIAN INSTITUTE OF TECHNOLOGY DELHI



## HIGH-VALUE SPONSORED PROJECTS

**MOBILE EARTHQUAKE EXHIBITION:  
EDUCATING MASSES ON EARTHQUAKE-  
RESISTANT DESIGN OF STRUCTURES (UNDER  
CSR SCHEME)**

SA: Resistoflex Dynamics Pvt. Ltd. India  
PI: Prof. Vasant A Matsagar  
Dept: Civil Engineering

₹  
1  
CRORE

**DESIGN & DEVELOPMENT OF A DEVICE FOR  
EFFICIENT REMOVAL AND RECOVERY OF  
HEAVY METALS FROM THE FUMES OF  
RASAUSHADHIES DURING THEIR  
PREPARATION**

SA: CCRAS, Ministry of AYUSH  
PI: Prof. Sumer Singh  
Dept: Design

₹  
1.69  
CRORES

**ENGINEERED MICROBIOME (E-BIOME): SIMPLE,  
SCIENTIFIC & SELF-SUSTAINABLE ENGINE TO  
IMPROVE RURAL ENVIRONMENT (SERB  
RAMANUJAN FELLOWSHIP AWARDED TO DR.  
PANKAJ KUMAR GUPTA)**

SA: Science & Engineering Research Board  
PI: Prof. Anushree Malik  
Dept: CRDT

₹  
1.19  
CRORES

**DEVELOPMENT OF COMPOSITE CEMENT  
WITH SLAG AND FLY ASH IN INDIA**

SA: ECOCEM Materials Limited, France  
PI: Prof. Shashank Bishnoi  
Dept: Civil Engineering

₹  
1.16  
CRORES

**BIOMECHANICAL STUDY ON THE EFFICACY  
OF REHABILITATION FOR SUBJECTS WITH  
TRAUMA-INDUCED GAIT IMPAIRMENT**

SA: DRDO, Ministry of Defence  
PI: Prof. Kaushik Mukherjee  
Dept: Mechanical Engineering

₹  
2.8  
CRORES

**SYNTHESIS OF PORPHYRIN ARRAYS AND  
THEIR ROLES IN SINGLET FISSION (SF) (DST  
INSPIRE FACULTY FELLOWSHIP PROJECT  
AWARDED TO DR. NITIKA GROVER)**

SA: DST  
PI: Prof. Nidhi Jain  
Dept: Chemistry

₹  
1.12  
CRORES

**DESIGN AND DEVELOPMENT OF DIFFRACTIVE  
OPTICAL ELEMENT AS SPECTRAL BEAM  
COMBINER FOR HIGH POWER LASER  
APPLICATION**

SA: DRDO, Ministry of Defence  
PI: Prof. Gufran Sayeed Khan  
Dept: Centre for Sensors, Instrumentation and  
Cyber Physical Systems Engineering

₹  
18.13  
CRORES

**VESICLE TEMPLATED SELF-REPLICATION  
PROCESS COUPLED WITH METABOLIC  
REACTION (INSPIRE FACULTY FELLOWSHIP  
AWARDED DR. MOUSUMI SAMANTA)**

SA: DST  
PI: Prof. V Haridas  
Dept: Chemistry

₹  
1.12  
CRORES

### LEGENDS

SA: Sponsoring Agency  
PI: Principal Investigator  
Dept: Department



## HIGH-VALUE SPONSORED PROJECTS (cont.)

### SOURCE APPORTIONMENT AND EMISSION INVENTORY FOR AMRITSAR CITY IN PUNJAB

SA: Punjab Pollution Control Board  
PI: Prof. Shashank Bishnoi  
Dept: Civil Engineering

₹  
1  
CRORE

### ABDUL KALAM TECHNOLOGY INNOVATION NATIONAL FELLOWSHIP AWARDED TO PROF. KEDAR BHALCHANDRA KHARE

SA: Indian National Academy of Engineering (INAE)  
PI: Prof. Kedar Bhalchandra Khare  
Dept: Optics and Photonics Centre

0.57  
CRORE

### PHOTON NUMBER RESOLVED SUPERCONDUCTING SINGLE PHOTON DETECTORS (PNR-SNSDP)

SA: DRDO, Ministry of Defence, Government of India  
PI: Prof. Krishna B Balasubramanian  
Dept: Material Science and Engineering

8.09  
CRORES

### OFF-GRID PV-VRFB-SC BASED ELECTRIC VEHICLE CHARGING INFRASTRUCTURE

SA: Department of Science and Technology (DST)  
PI: Prof. Sukumar Mishra  
Dept: Electrical Engineering

1.91  
CRORES

### ABDUL KALAM TECHNOLOGY INNOVATION NATIONAL FELLOWSHIP AWARDED TO DR. AMIT MEHNDIRATTA

SA: Indian National Academy of Engineering (INAE)  
PI: Prof. Amit Mehndiratta  
Dept: Centre for Biomedical Engineering

0.57  
CRORE

### REPAIR OF HIGH VALUE AL-ALLOYS USING COLD SPRAY TECHNOLOGY

SA: Aeronautics Research & Development Board  
PI: Prof. Ayan Bhowmik  
Dept: Material Science & Engineering

0.63  
CRORE

### DEVELOPMENT OF MACHINE LEARNING BASED ALGORITHMS FOR EV LOAD FORECASTING AND CHARGING INFRASTRUCTURE REQUIREMENT

SA: Tata Power Company Limited  
PI: Prof. Ashu Verma  
Dept: Energy Science and Engineering

0.50  
CRORE

### DEVELOPMENT OF FOUR-FOR-ONE-TWISTING MACHINE

SA: DHI, Govt. of India & M/s WeaveTech Engineers Limited  
PI: Prof. Dipayan Das  
Dept: Textile & Fibre Engineering

4.17  
CRORES

#### LEGENDS

SA: Sponsoring Agency  
PI: Principal Investigator  
Dept: Department



## HIGH-VALUE SPONSORED PROJECTS (cont.)

### RESEARCH PROPOSAL ON LARGE-SCALE TEMPORAL GRAPH MODELS

SA: Mastercard AI Garage India  
PI: Prof. Srikanta Bedathur Jagannath  
Dept: Computer Science & Engineering

0.55  
CRORE

### REPAIR OF HIGH VALUE AL-ALLOYS USING COLD SPRAY TECHNOLOGY

SA: Aeronautics Research & Development Board  
PI: Prof. Ayan Bhowmik  
Dept: Material Science & Engineering

0.53  
CRORE

### LIGHT DRIVEN REGIOSELECTIVE FLUORINATION AND TRIFLUOROMETHYLATION OF ARENES AND HETEROARENES

SA: Indian National Academy of Engineering (INAE)  
PI: Prof. Ravi P Singh  
Dept: Dept. of Chemistry

0.51  
CRORE

### UNDERSTANDING THE ROLE OF MIRCRO RNA MEDIATED REGULATION OF RAB GTPASES EXPRESSION AND MODULATION OF PHAGOSOME MATURATION

SA: Department of Biotechnology  
PI: Prof. Amitabha Mukhopadhyay  
Dept: School of Biological Sciences

1.11  
CRORES

### OXYGEN RELEASING BIOENERGETIC INJECTABLE GEL FOR CARTILAGE REGENERATION

SA: Indian Council of Medical Research  
PI: Prof. Sachin Kumar B  
Dept: Centre for Biomedical Engineering

1.10  
CRORES

#### LEGENDS

SA: Sponsoring Agency  
PI: Principal Investigator  
Dept: Department

## MEMORANDUM OF UNDERSTANDING (MoU)



## MEMORANDUM OF ASSOCIATION (MoA)

### MoU for Research Collaborations

- **Centre for Development of Telematics (C-DoT)** and IIT Delhi signed an MoU on 27 September 2022 for cooperation in various areas of telecom spanning IoT/M2M, AI/ML, Cyber Security, and 5G & Beyond technologies.

### MoA

- **National Hydroelectric Power Corporation Limited (NHPC)** signed an MoA with IIT Delhi on 21 November 2022 for developing capabilities in various fields of science & technology including hydro, water resources, geology, earthquake, renewable energy etc.



## CENTRE OF EXCELLENCE (CoE)

**GMR Power and Urban Infra Limited (Mumbai)** and IIT Delhi signed an MoU on 21 December 2022 for establishing the GMR CoE on New Energy Technologies at IIT Delhi. The CoE will undertake research and academic activities for interdisciplinary research and innovation in the areas of new energy technologies.



## STARTUPS

**Sixth call of the IRD Student Startup Action** invited proposals from students in all fields including the thrust areas from the

- Arun Duggal CoE for Research in Climate Change and Air Pollution (CERCA)
- ReNew Power CoE on Energy and Environment
- Nokia-Industry Consortium on Artificial Intelligence CoE on Smart Technology Enabled Manufacturing
- DESMI CoE on Waste to Wealth



## PATENTS

**Twenty-four new patents** have been filed between September 2022 to December 2022 from the following departments -

- Mechanical Engineering
- Textile and Fibre Engineering
- Material Science and Engineering
- Centre for Biomedical Engineering
- Centre for Applied Research in Electronics
- Centre for Automotive Research and Tribology
- Centre for Rural Development and Technology
- Biochemical Engineering and Biotechnology
- Applied Mechanics
- Electrical Engineering
- Chemical Engineering
- Physics

# NEW MULTI-INSTITUTIONAL FACULTY INTERDISCIPLINARY RESEARCH PROJECTS (MFIRP)

## SELECTED AIIMS-IITD PROJECTS OF CALL-2022

- 1** Developing artificial intelligence-based model for detection of malignant potential of pulmonary nodules in sarcoma using computed tomographic imaging and its prospective validation  
IITD PI: Dr. Amit Mehndiratta  
Dept: Centre for Biomedical Engineering  
AIIMS PI, Co-PI: Dr. Devasenathipathy Kandasamy, Dr. Krithika Rangarajan; Dr. Sameer Bakhshi  
Dept: Radio Diagnosis; Medical Oncology
- 2** Development of transparent strip crown for tooth restoration in children with dental caries  
IITD PI: Dr. Bhabani Kumar Satapathy  
Dept: Material Science & Engineering  
AIIMS PI, Co-PI: Dr. Vijay Prakash Mathur, Dr. Rahul Morankar  
Dept: Pedodontics & Preventive Dentistry
- 3** Development of an objective bioimpedance based non-invasive pulp vitality testing device as an alternative to traditional non-invasive pulp vitality testing methods  
IITD PI: Dr. Biswarup Mukherjee  
Dept: Centre for Biomedical Engineering  
AIIMS PI, Co-PI: Dr. Rahul Morankar, Dr. Vijay Prakash Mathur, Dr. Kalpana Bansal, Dr. Nitesh Tewari  
Dept: Pedodontics & Preventive Dentistry
- 4** Evaluation of effect of traumatic forces on alveolar bone, osseointegrated implants and prosthesis in an implanted prosthesis in anterior maxilla: a biomechanical analysis  
IITD PI: Dr. Arnab Chanda  
Dept: Centre for Biomedical Engineering  
AIIMS PI, Co-PI: Dr. Vijay Prakash Mathur, Dr. Nitesh Tewari, Dr. Dhiraj Kumar, Dr. Rahul Morankar  
Dept: Pedodontics & Preventive Dentistry
- 5** Development of wireless imaging system and wireless light source for arthroscopy  
IITD PI: Dr. Jay Dhariwal  
Dept: Design  
AIIMS PI: Dr. Ravi Mittal  
Dept: Orthopaedics
- 6** Development of point of care Smartphone based PT/INR Test to simplify, hasten identification of patients' coagulation status and its comparison with conventional coagulation method  
IITD PI: Dr. Kolin Paul  
Dept: Computer Science & Engineering  
AIIMS PI, Co-PI: Dr. S Arulsevi, Dr. Tapasyapreeti Mukhopadhyay; Dr. Deepak Agrawal  
Dept: Laboratory Medicine; Neurosurgery
- 7** A randomized controlled trial of the effectiveness of Transcranial Direct Current Stimulation (tDCS) for Treatment of Major Depression  
IITD PI: Dr. Tapan Kumar Gandhi  
Dept: Electrical Engineering  
AIIMS PI: Dr. Rohit Verma  
Dept: Laboratory Medicine; Neurosurgery
- 8** Understanding the impact of particulate matter and its physicochemical properties on cardiopulmonary health in a healthy and susceptible cohort in Delhi  
IITD PI: Dr. Gazala Habib  
Dept: Civil Engineering  
AIIMS PI, Co-PI: Dr. Ambuj Roy, Dr. Sandeep Singh  
Dept: Cardiology



- 9** **Wearable electronics for swallow-graphy in stroke patients**  
IITD PI: Dr. Deepak Joshi  
Dept: Centre for Biomedical Engineering  
AIIMS PI, Co-PI: Dr. Awadh Kishor Pandit; Dr. Smita Manchanda  
Dept: Neurology; Radiodiagnosis and Interventional Radiology
- 10** **Development of TIRF based microscopic system with smartphone camera as a detector for autofluorescence dependent intraoperative identification of parathyroid tissue.**  
IITD PI: Dr. Dalip Singh Mehta  
Dept: Physics  
AIIMS PI, Co-PI: Dr. Kamal Kataria, Dr. Sunil Chumber, Dr. Yashwant Rathore; Dr. Shipra Agarwal  
Dept: Surgical Disciplines; Pathology
- 11** **Development of an Affordable, Advanced Medicine Reminder-cum-Dispenser for Indian Patients with Cancer**  
IITD PI, Co-PI: Dr. Srinivasan Venkataraman, Dr. Jay Dhariwal  
Dept: Design  
AIIMS PI, Co-PI: Dr. Atul Batra; Dr. Nishkarsh Gupta  
Dept: Medical Oncology; Onco-Anaesthesia & Palliative Medicine
- 12** **In silico study on pedicle screw loosening in scoliotic patients**  
IITD PI, Co-PI: Dr. Anoop Chawla, Dr. Kaushik Mukherjee, Dr. Sudipto Mukherjee  
Dept: Mechanical Engineering  
AIIMS PI, Co-PI: Dr. Bhavuk Garg, Dr. Rajesh Malhotra  
Dept: Orthopedics
- 13** **Indigenous digital objective visual acuity test for pre-verbal children**  
IITD PI: Dr. Tapan Kumar Gandhil  
Dept: Electrical Engineering  
AIIMS PI: Dr. Rohit Saxena, Dr. Radhika Tandon  
Dept: Ophthalmology
- 14** **Virtual Reality (VR) assisted 3D endoscope for minimal access (laparoscopic) surgery**  
IITD PI: Dr. Joby Joseph Dr. Manish Kumar  
Dept: Optics and Photonics Centre; SENSE  
AIIMS PI, Co-PI: Dr. Hemanga K Bhattacharjee, Dr. Mohit Joshi, Dr. Vishal Anand  
Dept: Surgical Disciplines
- 15** **Indigenous design and fabrication of auxetic vascular stents using the laser powder-bed fusion techniques- a pilot study**  
IITD PI: Dr. Kusum Meena, Dr. Sagar Sarkari  
Dept: Mechanical Engineering  
AIIMS PI: Dr. Chandrashekhara  
Dept: Radiology
- 16** **Development of Surface Enhanced Raman Scattering (SERS) based Biosensor for Rapid Detection of oligonucleotides in MDR-TB and XDR-TB**  
IITD PI: Dr. Jitendra Pratap Singh  
Dept: Physics  
AIIMS PI, Co-PI: Dr. Urvashi B Singh, Dr. Kiran Bala, Dr. Sabyasachi Bandyopadhyay  
Dept: Microbiology
- 17** **Evaluation of adaptability of an indigenously developed low-cost light weight polycentric polymeric knee joint (PPKJ) and its effect on quality of life and rehabilitation on post traumatic transfemoral amputees.**  
IITD PI: Dr. Naresh Bhatnagar  
Dept: Mechanical Engineering  
AIIMS PI, Co-PI: Dr. Mohit Joshi; Dr. Sushma Sagar, Dr. S L Yadav  
Dept: Surgery; Trauma Surgery; Dept. of PMR In-charge Prosthetic & Orthotic Workshop
- 18** **Deciphering the molecular mechanisms of cell adhesion and chemoresistance in BCR-ABL positive B-cell acute lymphoblastic leukemia (B-ALL) and B-lymphoid blast phase of chronic myeloid leukemia (CML) carrying IKZF1 mutations**  
IITD PI: Dr. Anita Roy  
Dept: School of Biological Sciences  
AIIMS PI: Dr. Sanjeev Kumar Gupta  
Dept: Laboratory Oncology



# NEW MULTI-INSTITUTIONAL FACULTY INTERDISCIPLINARY RESEARCH PROJECTS (MFIRP)

## SELECTED WATERLOO-IITD PROJECTS OF CALL 2022



Rational designing of Thermo-stable materials for in-situ CO<sub>2</sub> sorption and enhanced hydrogen production in WGS reaction

**IITD PI:** Prof. Bijay Prakash Tripathi **UW PI:** Prof. Xiao-Yu Wu  
**Dept:** Material Science & Engineering **Dept:** Mechanical & Mechatronics Engineering

Designing Artificial Quantum Heterosystems For Reconfigurable Electronic Devices

**IITD PI:** Prof. Nirat Ray **UW PI:** Prof. Adam Wei Tsen  
**Dept:** Material Science & Engineering **Dept:** Chemistry

Regenerative optimization of novel heat exchangers :- applications in waste-heat recovery, electric vehicles (EVs) and electronics

**IITD PI:** Prof. Prateek Gupta **UW PI:** Prof. Jean Pierre Hickey  
**Dept:** Applied Mechanics **Dept:** Mechanical & Mechatronics Engineering

Environment-dependent nanomechanics and nanotribology of patterned tantalum-based thin films for advanced electronic device fabrication

**IITD PI:** Prof. Nitya Nand Gosvami **UW PI:** Prof. Ting Tsui  
**Dept:** Material Science & Engineering **Dept:** Chemical Engineering

Enhancing the Resilience and Durability of Structures using Cost-effective Fe-based Shape Memory Alloys

**IITD PI:** Prof. Dipti Ranjan Sahoo **UW PI:** Prof. Eugene Kim  
**Dept:** Civil Engineering **Dept:** Civil & Environmental Engineering

## NEW CALL ANNOUNCED FOR INVITING RESEARCH PROPOSALS

陽明交大  
NYCU

### National Yang Ming Chiao Tung University (NYCU), Taiwan

The second call for the joint research projects between NYCU and IIT Delhi was invited primarily in the areas of Semiconductors and secondarily in the areas of Medical Sciences & Technology, Civil Engineering, Nanomaterial for Biosensors and other research areas.

### Regional Centre for Biotechnology

The second call for joint collaborative research proposals between the Regional Centre for Biotechnology (RCB) and the Indian Institute of Technology Delhi (IITD) were invited from all fields, especially where a synergistic benefit (either basic/applied/translational) can be demonstrated by inter-institutional collaboration. This is to establish the "RCB-IITD Collaborative Platform" for initiating wide ranging collaborations involving academics, research, product, process and human resource development which will have profound social and economic impact for our country.



United Nations  
Educational, Scientific and  
Cultural Organization

क्षेत्रीय वैज्ञानिक प्रौद्योगिकी केंद्र  
Regional Centre  
for Biotechnology





# NEW MULTI-INSTITUTIONAL FACULTY INTERDISCIPLINARY RESEARCH PROJECTS (MFIRP)



## SELECTED UCL-IITD PROJECTS OF CALL 2022

1

**Large shear strain behaviour for soil pile-monopile interfaces subjected to cyclic loading in offshore wind structures**

IITD PI: Prof. Debayan Bhattacharya & Prof. Prashanth Vangla  
Dept: Civil Engineering

UCL PI: Prof. Beatrice Baudet, Prof. Matthew Richard Coop & Dr Susana Lopez-Querol  
Dept: Civil, Environ & Geomatic Engineering

2

**An approach closer to real photosynthesis: photovoltaic solar cell driven photoelectrochemical CO<sub>2</sub> reduction using hybrid plasmonic nanomaterials towards sustainable solar fuels production**

IITD PI: Prof. Pravin Popinand Ingole  
Dept: Chemistry

UCL PI: Prof. Mojtaba Abdi Jalebi & Dr. Nusrat Rashid  
Dept: Institute for Materials Discovery

3

**Exploring the spatiotemporal patterns of water stable-isotope across Indo-Gangetic plains to understand the regional hydroclimate**

IITD PI: Prof. Yama Dixit  
Dept: Centre for Atmospheric Sciences

UCL PI: Prof. Jonathan Holmes  
Dept: Geography

4

**Lifing prediction of complex Ni-based superalloys for nuclear application using complementary experimental microstructural characterisation and constitutive modelling**

IITD PI: Prof. Ayan Bhowmik & Suresh Neelakantan  
Dept: Material Science & Engineering

UCL PI: Prof. Enrique Galindo-Nava  
Dept: Mechanical Engineering

5

**Tuning the Charge Transport in Organic Semiconductors through Strategic Functionalization: A Combined Experimental and Computational Approach**

IITD PI: Prof. Dibyajyoti Ghosh  
Dept: Material Science & Engineering

UCL PI: Prof. Tracey M. Clarke  
Dept: Chemistry

6

**Effect of Reactor Configuration on Synthesis of Nanoparticles**

IITD PI: Prof. Vivek Vitthal Buwa  
Dept: Chemical Engineering

UCL PI: Prof. Asterios Gavriilidis  
Dept: Chemical Engineering

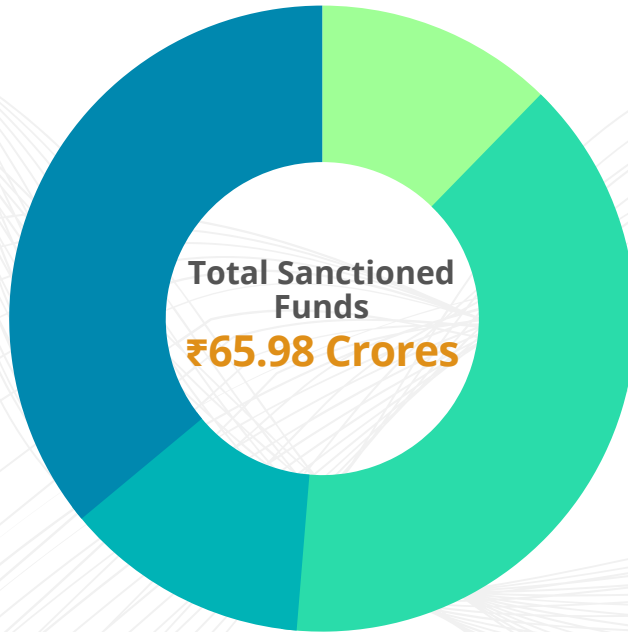
7

**Creative visual methodologies for higher education: A transnational pedagogical project**

IITD PI: Prof. Subir Dey  
Dept: Design

UCL PI: Prof. Eleanor Chiari  
Dept: School of European Languages, Cultures and Society

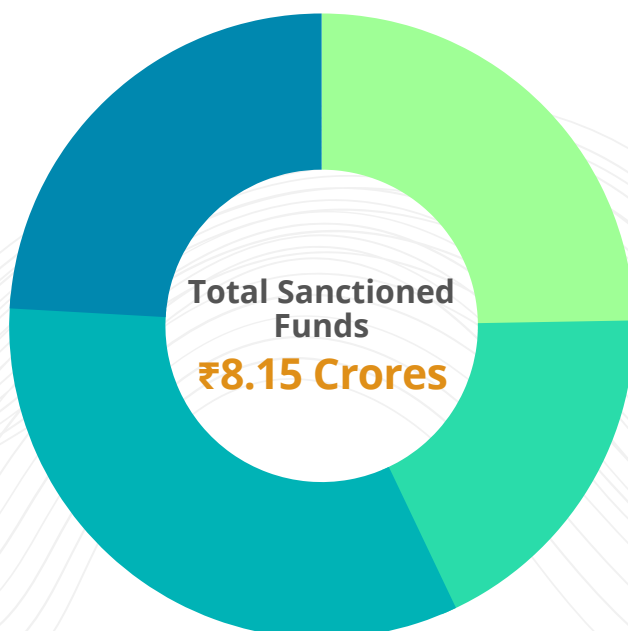
## SPONSORED ROJECTS (RP + Externally Funded MI)



### Sanctioned Funds

- September  
₹8.10 Crores | 15 Projects
- October  
₹25.74 Crores | 21 Projects
- November  
₹8.34 Crores | 29 Projects
- December  
₹23.77 Crores | 35 Projects

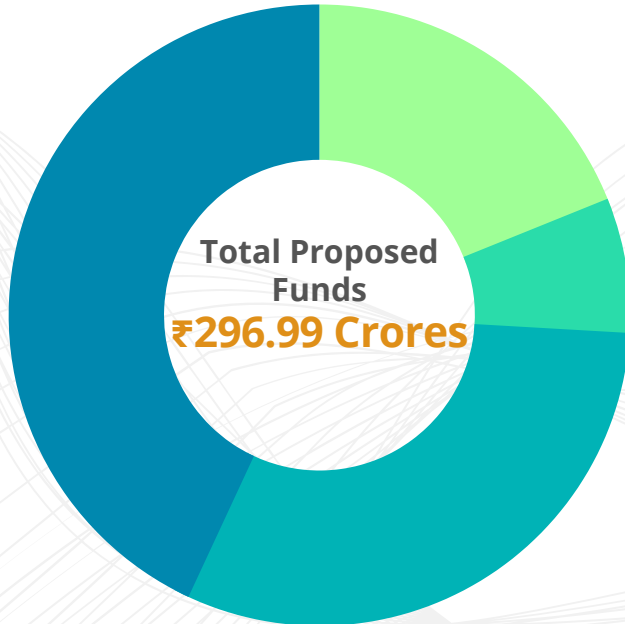
## CONSULTANCY JOBS



### Sanctioned Funds

- September  
₹2.01 Crores | 31 Projects
- October  
₹1.48 Crores | 23 Projects
- November  
₹2.68 Crores | 32 Projects
- December  
₹1.96 Crores | 35 Projects

# SPONSORED PROJECT PROPOSALS APPROVED FOR SUBMISSION TO FUNDING AGENCIES



## Proposed Funds

- September  
₹56.09 Crores | 31 Projects
- October  
₹20.87 Crores | 44 Projects
- November  
₹92.10 Crores | 44 Projects
- December  
₹ 127.93 Crores | 39 Projects

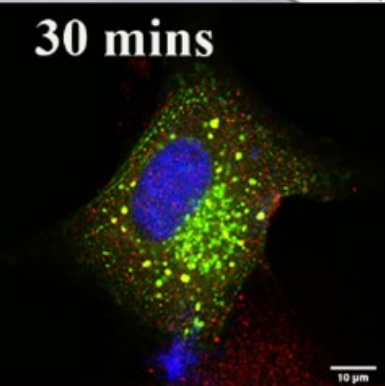
## SIGNIFICANT RESEARCH



### IIT Delhi Team Developed a Technology for Industrial Scale Production of Nanofibres

Researchers at IIT Delhi's SMITA Research Lab have developed a technology for the industrial scale production of nanofibers, which is superior to the commercial technologies available in other countries. The technology is a game changer for meeting tighter standards of vehicular pollutions, for protection of individuals from rising air pollution, and health care devices, etc.

30 mins



### Researchers at IIT Delhi Develop a VLP-based Vaccine Candidate Against COVID-19

Researchers at IIT Delhi in collaboration with Translational Health Science and Technology Institute (THSTI), Faridabad, Haryana have developed SARS-CoV-2 Virus-Like Particles (VLPs), which are a possible vaccine candidate. The VLPs tricked the immune system into launching a counterattack in mice, just as it does against SARS-CoV-2.

# IRD CONNECT

SEPTEMBER - DECEMBER 2022



**Winners are not those who never fail but those who never quit.**

- Dr. A.P.J. ABDUL KALAM

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