

The Institute has registered a steady growth in its Research and Development activities in this year. The number of externally funded ongoing projects has reached 553 with a total sanctioned amount of Rs. 511 crores. During 2015 - 2016, the Institute received sanctions for 161 sponsored projects worth Rs. 98 crores and 122 consultancy projects of value Rs. 16 crores. Some of the major grants sanctioned by various agencies during the year include Department of Science and Technology (DST, Rs. 25 crores), Ministry of Communications and Information Technology (MCIT, Rs. 17.5 crores), Science and Engineering Research Board (SERB, Rs. 14 crores), Ministry of Human Resource and Development (MHRD, Rs. 9 crores), Board of Research in Nuclear Sciences (BRNS, Rs. 5 crores), and Bhabha Atomic Research Center (BARC Rs. 5 crores). Some of the major industries which have funded projects this year include Central Pollution Control Board, Ford Motor Company, GAIL (India) Limited, Hindustan Petroleum Corporation Limited, International Water Management Institute, U. P. Small Industry Dev. Corpn., Unilever Industries Pvt. Ltd., Larsen & Toubro Limited, Hindustan Aeronautics Limited, National Thermal Power Corporation, Research Designs & Standards Organisation (RDSO), Samsung (India), Boeing, Lanco Infratech Ltd.

During the year, 45 patents including 7 design patents were filed and 7 earlier filed patents were granted, besides getting 4 technologies licensed for commercialization. The earning from intellectual property in this year stands around Rs 17 lakhs.

Till date, 344 Indian Patents have been filed, out of which 34 patents have been granted so far. Altogether 53 technologies have been licensed for commercialization to date.

A total of 24 companies are currently being incubated at SIDBI Innovation and Incubation Centre (SIIC), IIT Kanpur and 38 have graduated till date.

Major Projects Sanctioned

Some of the major projects sanctioned in 2015-16 are briefly described below.

A project titled *Studies on Aerosol Behavior under Severe Accident Conditions in the Context of Indian Nuclear Reactors by Setting Up of National Aerosol Facility* has been funded by Bhabha Atomic Research Center and Board of Research in Nuclear Sciences. Nuclear energy is a viable option to meet the country's increasing demand of energy. Nuclear reactor safety is often analyzed using numerical simulators but the need for experiments is clear. In this

context, the first National Aerosol Facility in the country, and indeed in academic institutes of Asia, is currently being set up on our campus with the support of Department of Atomic Energy. This new facility will help quantify the aerosol source term simulators for 'Severe Reactor Accident Scenario' and their impact on the environment.

Ministry of Human Resource and Development has funded the establishment of a *Design Innovation Centre* at IIT Kanpur to promote a culture of innovation and creative problem solving. The Centre aims to facilitate interdisciplinary design-focused education, research, and entrepreneurial activities, besides encouraging partnerships between academia and industry for commercialising the technologies.

The Ministry of Communication and Information Technology (MCIT) funded a major project to set up *Electronics and ICT Academics*. The project aims at the development and delivery of a high technology platform using cloud computing and other state of the art storage and delivery mechanisms for delivery of courses in the Information and Communication Technology. The platform would build upon, improve and scale existing technology platforms in the education domain already developed and tested at IIT Kanpur like intelligent tutor and Mini MOOC platforms for capacity building of sixteen thousand faculty members across four states of Uttar Pradesh, Haryana, Delhi and Chandigarh.

The Ministry of Human Resource Development funded a project titled *Teaching and Learning Centre*. The Centre will work at multiple levels: at Teacher Enablement and Quality Improvement; Curriculum Audit, Curriculum Design, Curriculum Adoption Strategy; design and develop powerful electronic platforms to enable the above the two modes of interaction. This portal will play the host of all electronic course offerings from IIT Kanpur.

The project titled *Understanding Innate Responses to Odors and Odor Mixtures: Across-Species Integrated Approach* is funded by the University Grants Commission (UGC) and the Israel Science Foundation (ISF). Mosquitoes detect humans using a variety of cues, among which host odors play an important role. Similarly, in other species such as mice, specific odors can elicit innate attraction or aversion, and these behavioral responses help in the detection of food, danger, or mates. The mechanisms which determine the innate valence for odors are not well understood. The project would involve a set of experiments that combine electrophysiology, behavioral

tests, and optogenetics stimulations in two animal systems (mosquitoes and mice) to determine the underlying mechanisms.

The project titled a *Triggered Source of Single Photons and Photon Pairs* funded by SERB proposes to develop a high-brightness triggered source of single photons and photon pairs, using laser cooled ensemble of Rubidium atoms coupled to two optical cavities. A cascaded four-wave mixing scheme is proposed for optically pumped cold atoms to generate on-demand photons together with a fast multi-photon counting system to characterize the source. The key novelty of the project is implementation of a double-cavity system integrated in conjunction with the atomic ensemble to enable operation at extremely low light levels. The high brightness photon source, once developed will be used, in conjunction with a confocal microscope to couple triggered photons to single nano-particles, towards creating an interface between cold atoms and solid-state materials.

The project titled *Active Fault, Paleoseismic and Crustal Deformation in North-West and Central Himalaya India: An Integrated Approach Towards Seismic Hazard Assessment* is part of a national initiative by Ministry of Earth Sciences. It covers area from Kumaon-Garhwal and Himachal Pradesh in Himalaya. The objectives of the project is to identify the most earthquake prone (seismically active) areas in Himalaya; to prepare Digital Active Fault Atlas of Himalaya; reconstruction of Pale-earthquake History; measure Crustal Deformation through a permanent GPS-network; and assessment of earthquake hazard in Himalaya and its neighborhood.

The Department of Science and Technology funded the project titled *Developing Prototype of a Smart Superconducting Fault Current Limiter (SCFCLSM) with Three Dimensional Field and Current Mapping Technology for Early Fault and Hot Spot Detection*. There is an ever increasing need for protecting power grids against damage by making them resistant to faults which are major fluctuations in the power drawn from a grid. The project aims to build the prototype of a smart superconducting circuit breaker which isolates the power grids during a fault condition. A new imaging technique which helps in detecting local hot region (hot spots) generated in superconducting switches is also being developed. Image of a hot spot

imaging technique that is being built is shown.

Department of Biotechnology funded a project titled *Modulation of Adeno-Associated Virus (AAV) Replication by Host Cell Transcriptional Repressors: Pharmacologic and RNA Interference to Improve AAV Vector Delivery during Gene Therapy*. Gene therapy using adeno-associated virus (AAV) vectors is an attractive strategy for the treatment of human genetic diseases. The current project attempts to understand the cellular regulators involved in anti-viral immunity in general and microRNAs, in particular. This information will then be used to design strategies to modulate specific microRNA regulators to dampen the host immune response during liver directed gene therapy.

Research Infrastructure

Honourable Prime Minister, Shri Narendra Modi conducted remote launching of the National Center for Flexible Electronics at IIT Kanpur on July 1, 2015 as a part of the national mission on 'Digital India', sponsored by the Department of Electronics and Information Technology (DeitY).

Department of Chemistry received a Level II FIST grant of DST amounting to Rs 5.2 crores for installing Single Crystal X-Ray Diffractometer, Mass Spectrometry and a Cell Culture Facility at IIT Kanpur.

Department of Biological Engineering and Biosciences received a similar Level II FIST grant of Rs. 4.86 crores to augment research infrastructure and initiate new lines of investigations in molecular and structural biology by installing a high-end Fluorescence-Activated Cell Sorting (FACS), a next-generation sequencing system, a robotic device for crystallisation of membrane proteins. Additionally, a high-resolution micro-computed tomography (micro-CT) system is being added for imaging small animals.

Similarly, Department of Civil Engineering received generous equipment grants of Rs. 6.60 crore under FIST to procure 2500 kN servo-hydraulic four column loading frame, controller of Universal Testing Machine (UTM), 600 lpm Hydraulic Power Unit, Cyclic Simple Shear Apparatus, Instrumentation and Data Acquisition system (for the Pseudo Dynamic testing facility), Water Isotope Analyzer and short range laser scanner.

PATENTS FILED BY THE FACULTY DURING THE FINANCIAL YEAR 2015-16

1. A Printing Based Method of Fabricating A Metal Oxide Thin Film And Its Device Component Thereof
2. Prevention of Surface Adsorption of Calmidazolium Chloride to Inhibit Huntingtin Fragment Aggregation Linked to Huntington`s Disease
3. A Hydrogen/Methanol Based Low Working Temperature Polymer Electrolyte Membrane Fuel Cell
4. Human Hand Detection From Structure Light Based 3D Sensor
5. Rotational-Magnetoreological Abrasive Flow Finishing (R-MRAFF) Process for Nano Finishing of Complex Surfaces/Knee Joint Implant
6. Hierarchically Porous Polymer, Carbon, Silica And Composite Carbon/Silica Monoliths With Ultra High Bet Surface Area Synthesized By Combined Templated Sol-Gel And Micro-Phase Separation For Applications In Supported Metal Catalysis
7. Design Of Emission Tomographic Measurement Set-Up For Plasma Application
8. Fluorescent Marker For Protein Labeling
9. Automatic Mechanical Pricking Machine
10. Method of Extraction For A Non-Ionic Surfactant Adsorbed on Biodegradable Polymeric Nanoparticles
11. System, Method and Device For Diagnosis Of Cancer Based On Polarized Fluorescence
12. Microvalve For Fluidic Applications
13. A Portable Microfluidic Chip Holder
14. A Biomolecule Micro-Patterning Method And Patterened Substrate Thereof
15. Peltify Wearable Device For Thermoregulation
16. Design For Disability: A Waist Wearable for Visually Challenged for Indoor Navigation
17. Business Purpose Utility Vehicle-Vegetable Cart
18. Business Purpose Utility Vehicle-Ironing Cart
19. Business Purpose Utility Vehicle-Saloon
20. Stabilized Material for Subgrade Pavement
21. A One-Pot Process For The Synthesis Of Indole And Indole Derivatives
22. A System For Particle Generator In PIV Applications
23. High Endurance Quadrotor Helicopter
24. Flexible Supercapacitors Utilizing Electrochemically Active Materials Based Nanocomposite Hybrid Electrodes and Method of Manufacturing Thereof
25. Temperature Sensitive Paint for the Usage In Green Spectrum of Light
26. High Dynamic Range (HDR) Imaging System and Method Thereof`
27. An Integrated Solar Energy Harvesting And Storage
28. An Apparatus For Shadow-Mask Deposition And Method Thereof
29. Seed Sowing Boot For Grain And/Or Granular Fertilizer`
30. Arginine Derivatives As Polyglutamine Aggregation Inhibitors
31. Device For Power Control And Storm Protection For Variable Pitch Vertical Axis Wind Turbine (VAWT)
32. A 3d Integrated Universal Digital Gate
33. Packaging System For Large Caliber Ammunition
34. Door Latch With Inbuilt Locking System
35. A Method Of Fabricating High-Performance Poly (Vinylidenedifluoride-Trifluoroethylene), P (VDF-TRFE) Films
36. Improved Method For Extraction Of Lipopolysaccharide
37. Optimization of Design and Characterization of Novel Micro-Pumping System With Peristaltic Motion
38. A Prosthetic Assembly With Dynamic Ankle Joint
39. Apparatus And Method For Real Time Foreground Extraction
40. Project Umbrella
41. Career Cards
42. System And Method for Absolute Mass Determination
43. Integrated Hybrid Bio-Artificial Liver Bioreactor Design and Thereof
44. Method For Monitoring the Health of Aluminium Electrolytic Capacitor
45. Solar Hybrid Polymer Electrolyte Membrane Fuel Cell (PEMFC)

TECHNOLOGY TRANSFER DURING THE FINANCIAL YEAR 2015-16

1. Intelligent Tutor system Licensed
2. Briter Cell Line
3. PM1 Sampler
4. Weak Supervision for person identification and robust learning in the presence of Noise
5. Hierarchically Porous Polymer, Carbon, Silica and Composite Carbon/Silica Monoliths with Ultra High BET Surface Area Synthesized by Combined Templated Sol-gel and Micro-phase separation for applications in Supported Metal Catalysis

MEMORANDUM OF UNDERSTANDING

During the year 2015-16, IIT Kanpur strengthened its relation with many National and International Institutes and organizations through research collaborations and signed several Memorandums of Understanding. During the year, the following institutes/ universities/ organizations have joined hands with IIT Kanpur for the purpose of research work in the diverse fields of science and technology. Some of these organizations are:

MoU Signed with institutes/ universities/ organizations

1. WWF – India, New Delhi, for conducting the project titled Develop Airborne Remote Sensing Technology for Monitoring Water Quality of river Ganga
2. National Institute of Industrial Engineering, Mumbai, for conducting the project titled jointly work on products under the National ERP mission.
3. National Institute of Technology Patna to strengthen academic and scientific collaboration.
4. WWF – India, New Delhi, for undertaking Clean Technology Research
5. Commonwealth of Learning, Vancouver (COL), Canada, for conducting the project titled Design, Building, testing and operationalization of a portal for MOOCs for Development.
6. Central Manufacturing Technology Institute, Bangalore, for extension of MoU till 31st March 2017.
7. LDA Lucknow, for conducting the project titled Inspection related to Civil and Electrical activities.
8. Department of Biotechnology, New Delhi, for conducting the project titled for the project titled, “Understanding the functional regulation of fragile X mental retardation protein (FMRP) using murine models of a neurological disorder”.
9. Indira Gandhi for Atomic Research, Kalpakkam, for conducting the project titled For the project titled, “CSRDM Shroud tube hydraulics of control plug in fast breeder reactors”
10. Research Design & Standards Organization, Lucknow, for conducting the project titled SMS Based Train Information for Indian Railways
11. Research Design & Standards Organization, Lucknow, for conducting the project titled Design of Micropiles to Stabilize Railway Embankment
12. Research Design & Standards Organization, Lucknow, for conducting the project titled Technology management, best practices & impact assessment of R&D projects of RDSO
13. Research Design & Standards Organization, Lucknow, for conducting the project titled Development of suitable & vandal-proof (RD-Id based) advance warning system to Pre-warn Road Users about Approaching Trains at Unmanned LC gate for Indian Railways.
14. Department of Biotechnology, New Delhi, for conducting the project titled for the project titled, “Membrane curvature sensing and generation by proteins in lipid bilayer membrane.”
15. European Organization of Nuclear Research (CERN), for conducting the project titled for the study on The Future Circular Collider (FCC) hosted by CERN.
16. ICIMOD, Kathmandu, for conducting the project titled for a study on Sediment Dynamics and Sediment connectivity in the Koshi basin: Implication for river hazards.
17. University of California Berkeley, USA, for conducting the project titled first amendment to Sub Award Agreement
18. Dr. Prabhakar Goel, USA, for conducting the project titled to utilize the interest income from the Foundation to be utilized to seed fund research projects and faculty chair.[R]
19. Bhabha Atomic Research Centre (BARC), for amendment to MoU for the project titled, “Experimental Evaluation of Aerosols Behavior Relevant to Indian Nuclear Reaction.”
20. Vikram Sarabhai Space Center (VSSC), ISRO, for conducting the project titled, “Design, Fabrication and Wind Tunnel Testing of suitable Scaled Models of Launch Vehicles at Low Subsonic speeds.”

21. Ministry of Railways, New Delhi, for developing a long term frame work for research collaboration.
22. Petroleum Institute, UAE, for the Project titled, "A condition monitoring system with multi agent mechanism for external non-contact smart inspection of buried oil and gas pipelines".
23. International Water Management Institute, Sri Lanka, for the project titled, "Restoring the Ganges: Healthier rivers for safer water and more productive agro-ecosystems".
24. Commonwealth of Learning, Vancouver (COL), Canada, for developing a common understanding of usefulness of a portal for building and offering Massive Open Online Courses.
25. IIT Bombay, Mumbai, for the project titled, "Gamification of Education".
26. Department of Biotechnology, New Delhi, for the project titled, "Program support on Translational Research on Biomaterials for Orthopedic and Dental applications."
27. Wildlife Trust of India, Noida, for conducting Work contract for the Project titled, "Training on moonj grass weaving."
28. Ministry of Human Resource Development (MHRD), New Delhi, for implementation of Scheme National Initiative for Setting up of Design Innovation Centers, Open Design School & National Design Innovation Network.
29. Ministry of Defense, Government of India, Delhi, for the Project titled, "Design and Development of Symmetric Key Encryption Algorithm for Indian Air Force".
30. IMTECH-CSIR, Chandigarh, for the Project titled, "Understanding the molecular self-assembly of peptide and peptide like small molecules i.e Peptidomimetics".
31. International Water Management Institute, Pelawatte, Sri Lanka, for extension of an MOU titled, "Restoring the Ganges: Healthier rivers for safer water and more productive agro-ecosystems."
32. Regents of the University of California, Berkeley, for amendment to the Project titled, "Unified Compact Model of Advanced CMOS Structures."
33. The Netherlands Organization for Scientific Research (NWO), Physical Sciences Division, Netherlands and Others for the Project titled, "Kumbh Mela: Measures and Understanding the dynamics of mankind's largest crowd".
34. DTU Wind Energy Denmark and Others, addendum Regarding Steering Board Contact Information and Accession of Global Casting and Michigan State University.
35. Motilal Nehru National Institute of Technology, Allahabad UP, for promoting academic and research cooperation and the development of the Institutes as Centers of excellence of higher and technical education, scientific research and implementation of Scheme for Trainee Teachers Award.

MoU Signed with companies

1. LG Soft India Private Limited, Bangalore, for renewal of Research Agreement
2. Steel Authority of India Limited, New Delhi, for exploring & identifying Joint research programs on topic of mutual interest.
3. Coral Telecom, Noida, for development of Telecom hardware and software products as per the market requirements.
4. Ikan Innovations and Technologies Pvt. Ltd., Lucknow, to collaborate in the areas of commercialization, evaluation and enhancement of technologies, products and services developed by IITK; consultancy services that match with IITK capabilities; creating work contracts worldwide.
5. Goldman Sachs Services Private Limited, Bangalore, to conduct a competition amongst the students of IITK for development of a real time text to speech mobile app.
6. United Technologies Corporation Pratt & Whitney Division, for extension of the R&D Master Services Agreement
7. Applied Biological Materials Inc., for project titled License to use the Briter Cell Line for research and/or commercial applications.
8. Samsung Research India, New Delhi for taking the collaboration to a higher level through special industry oriented courses, technical talks and industry expert lectures, student projects and student technical contests.
9. Qualcomm Incorporated, USA, for conducting the project titled Training services and in support of Qualcomm Learning Center.
10. Qualcomm, USA, to provide training services on Channel Estimation and Equalization.
11. Sterlite Technologies Limited, for joint Collaboration Agreement for intensifying academic and research cooperation.

12. The Boeing Company, USA, for conducting the project.
13. Intel Technology India Private Ltd, Bengaluru, for Collaboration in the areas of curriculum development, student intern programs, sponsored and/or consultancy projects, collaborative exploration of research, student contests, faculty and Intel staff exchange, fellowship program, knowledge sharing and student mentoring, pilot projects, lab development activities, workshops etc.
14. Hindustan Petroleum Corporation Ltd. R&D Centre, Bangalore, for the project titled, "Characterization and Simulation of Performance of twin-fluid Atomizers".
15. UEducation Management Pvt. Ltd., Mumbai, to share experience and knowledge on Product Design and Experience, conduct live interactions with the participants.
16. Unilever Industries Pvt. Ltd., Bangalore, for the project titled, "Designer Peptide: Nucleic Acid (PNA) and Peptide Synthesis and Glycosylation Analyses towards understanding links between molecular structure and function".
17. Unilever Industries Pvt. Ltd., Bangalore, for the project titled, "Understand the structure-property relationships of liquid tea concentrates via rheology".
18. NTPC Limited, Noida, Service Purchase Order for development of Intelligent Electronic Transformer (IET) with DC source interface with IIT Kanpur
19. ABB Global Industries and Services, Bengaluru, for evaluation of effect of Electromagnetic (EM) devices for improved yield and/or product quality in steelmaking vessel.
20. Square KM Array (SKA) India Consortium, to explore, formulate, practice, promote activities related to the SKA project.
21. L&T Technology Services Limited, Vadodara, to collaborate for promotion of education, research and innovation in the areas of Granular Flow Analysis, Multibody Dynamics, Smart Grid System and Vibration and Noise Control.
22. Unilever Industries Pvt. Ltd., Bangalore, for the project titled, "Understanding effect of composition, processing and ageing of cleaning composition on rheology."
23. Tata Consultancy Services, Mumbai, for Research Advisory assignment on computational materials engineering for research programs executed by/through TCS Innovation Lab in Pune.
24. Renault Nissan Technology and Business Centre India Private Ltd. Chennai, for the project titled, "Study on Personal Drone Benefit for Driver Assist".
25. Oil and Natural Gas Corporation Ltd., New Delhi, for the project titled, "Modelling and Simulation of Methane Extraction from Gas Hydrates via Simultaneous Depressurization and CO₂ Injection."
26. Rashtriya Ispat Nigam Ltd, Visakhapatnam, for the Project Titled, "To reduce ladle balance and improve plant productivity."
27. Dow Chemical International Pvt.Ltd., Mumbai, to explore research and development opportunities and technical collaboration.
28. Emerson Network Power India Ltd., Thane, to design, develop products in the field of AC and DC Power and Precision Cooling Solutions for Network Power India requirements.
29. Tata Consultancy Services, Mumbai, for strengthening and developing the link between TCS and IITK through the formation of IITK-TCS Program.
30. GE India Technology Center Pvt. Ltd, Bangalore, for the project titled, "Development of a Control Architecture for a zone-less Induction Cook-Top".
31. Ford Motor Company, USA, for engaging consultant to consult on autonomous automobiles.
32. The Boeing Company, USA, for extension of a project agreement titled, "Supplier Statement of Work for AFC High Life Study."
33. The Boeing Company, USA, for the Project titled, "Active Flow Control High Lift Study."
34. Biotech Consortium India Limited, New Delhi, Transfer of Technology entitled 'An optical lens, lens filter and preparation thereof.
35. Robust Results Private Limited, Gurgaon, for 'Transfer of Technology entitled 'A platform for Intelligent Tutoring System'
36. Uttar Pradesh Rajya Vidyut Utpadan Nigam Limited, Lucknow, for conducting the project titled the study of socio economic for compliance of TOR in Environmental clearance for the 1*660 MW Panki Extension Super Critical Thermal Power Project at Panki TPS, Kanpur
37. Bharat Heavy Electricals Limited, Hyderabad, for the Project titled, "Feasibility study on the development of hydrophobic coating materials for minimization of steam turbine blade erosion due to droplet impact".
38. Samsung R&D Institute (SRI), Delhi, for the project titled, "Holistic Scene Understanding."

39. Oil and Natural Gas Corporation Limited, New Delhi, for the project titled, "Optical diagnostics of transport phenomena during Gas Hydrate formation and dissociation."
40. Applied Materials India Private Limited, Bangalore, for Membership Agreement
41. Emerson Network Pvt. Ltd. Thane, for the Project titled, "Voltage and Current Harmonic Compensation using Static Voltage Regular."
42. Visage Map, USA, for conducting the project titled Technology Transfer
43. Regency Hospital Ltd., Kanpur to collaborate in teaching, research and development.

A list of major sponsored and consultancy projects sanctioned during the financial year 2015-16 is provided below.

Sponsored Projects

1. Kanpur Local Chapter of Indian National Science Academy, Funded by Indian National Science Academy (Rs. 100000)
2. Modulation of Adeno - Associated Virus (AAV) Replication by Host Cell Transcriptional Repressors: Pharmacologic and RNAi Interference to Improve AAV Vector Delivery During Gene Therapy, Funded by Department of Biotechnology (Rs. 7257600)
3. Multi Sensor Approach for Land Slide Monitoring, Funded by Department of Science & Technology (Rs. 3661200)
4. SMDP-C2SD, Funded by CEERI Pilani (Rs. 150000)
5. Membrane Curvature Sensing and Generation by Proteins in Lipid Bilayer Membrane, Funded by Department of Biotechnology (Rs. 4571000)
6. MHRD IIT Council Webportal, Funded by Ministry of Human Resource Development (Rs. 1000000)
7. Quantum Criticality, Dynamics & Quantum Information Studies in Quantum Many Body Systems, Funded by Science & Engineering Research Board (Rs. 3297200)
8. INAE Kanpur Local Chapter, Funded by Indian National Academy of Engineering (Rs. 460000)
9. Electric Stress Control Using Filled Polymers, Funded by Science & Engineering Research Board (Rs. 4058598)
10. Geochemical and Isotopic Investigations of Tertiary Sediments from the NE India Understanding the Early Tectonic Uplift and Weathering in the Himalayas, Funded by Science & Engineering Research Board (Rs. 2920000)
11. Studies on Aerosol Behaviour Under Severe Accident Conditions in the Context of Indian Nuclear Reactors by Setting up of National Aerosol Facility, Funded by Bhabha Atomic Research Centre (Rs. 49000000)
12. Studies on Aerosol Behavior Under Severe Accident Conditions in the Context of Indian Nuclear Reactor by Setting up of National Aerosol Facility, Funded by BRNS (Rs. 49615000)
13. INSPIRE Faculty Award (MA-29), Funded by Department of Science & Technology (Rs. 2800000)
14. Inference of Rupture Characteristics of the 25 April 2015 Nepal Earthquake: A Proposal for a Reconnaissance Survey in Southern Nepal Funded by Ministry of Earth Sciences (Rs. 363000)
15. Gandhi's Critique of Modernity in Hind Swaraj: A Philosophical Study, Funded by Indian Council of Philosophical Research (Rs. 150000)
16. Instructional School for Teachers Titled Functional Analysis, Funded by National Centre for Mathematics (Rs. 513400)
17. Optimal Power Architecture for Next Generation Datacenters, Funded by Science & Engineering Research Board (Rs. 5289000)
18. Wind Tunnel Testing of Low RCS Intake, Funded by Aeronautical Development Agency (Rs. 1320000)
19. Target-Specific Nanomaterials as Contrast Agents for High Precision Multimodal Bioimaging Applications, Funded by Department of Science & Technology (Rs. 10218400)
20. Wind Tunnel Study of Launch Vehicle (LVM-3) at High Alpha, Funded by Vikram Sarabhai Space Centre (Rs. 1480000)
21. Double Perovskite Based Oxide Materials for Thermoelectric Applications, Funded by Science & Engineering Research Board (Rs. 6345791)
22. Yoga Camp & International Yoga Day, Funded by Central Council for Research in Yoga & Naturopathy (Rs. 100000)

23. Wind Tunnel Measurement on UAV Model, Funded by National Aerospace Laboratories (Rs. 1995000)
24. Design, Development & Field Testing of 1 KW Vertical Axis Wind Turbine at BTKIT Dwarahat, Funded by Miscellaneous (Rs. 600000)
25. Development of Compressed Air Based Test Bed for Pipe-Line Health Monitoring Robot, Funded by Gas Authority of India Ltd (Rs. 7106000)
26. Three Problems in Algebraic Complexity Theory, Funded by Department of Science & Technology (Rs. 6900000)
27. Structures Energetics and Vibrational Spectra of Large Molecular Assemblies Combined Experimental and Theoretical Studies Using Molecular Tailoring Approach on K Computer, Funded by Department of Science & Technology (Rs. 584000)
28. Design & Development of Pine Needle Based Smokeless Chulla, Funded by Miscellaneous (Rs. 600000)
29. J.C. Bose Fellowship, Funded by Science & Engineering Research Board (Rs. 6800000)
30. Numerical and Experimental Studies of Swirlstabilized Hydrogen Fuelled Combustor, Funded by Department of Science & Technology (Rs. 2634800)
31. J.C. Bose Fellowship, Funded by Science & Engineering Research Board (Rs. 6800000)
32. Develop Airborne Remote Sensing Technology Capable of Monitoring Water Quality of River Ganga, Funded by WWF-India (Rs. 1340400)
33. Joint Target Detection and Localization Algorithms for MIMO Radar Systems, Funded by Science & Engineering Research Board (Rs. 3191000)
34. Growth and Aging of Tissues Under Microgravity Environment, Funded by Space Technology Cell (Rs. 1110000)
35. Physical Metallurgy of Mg-Li Alloys and Coatings Phase-II, Funded by Space Technology Cell (Rs. 2873000)
36. Microwave Active Remote Sensing of Buried Objects, Funded by Space Technology Cell (Rs. 1990000)
37. Development of Novel Plasmonic Devices for Next Generation Chip Scale Technology Based on Nanophotonics, Funded by Space Technology Cell (Rs. 1658000)
38. Surface Texturing on Biocompatible Titanium Alloy for Inducing Hydrophobicity Using ECMM, Funded by Space Technology Cell (Rs. 600000)
39. Vibration Control of Cryo-Coolers used for Satellite Applications, Funded by Space Technology Cell (Rs. 2979600)
40. Development of Flexible Heat Pipe Based Passive Thermal Management Platforms, Funded by Space Technology Cell (Rs. 3500000)
41. Stress Concentration Factors (SCFs) in Curved Plates for Space Applications, Funded by Space Technology Cell (Rs. 2300000)
42. Wind Tunnel Testing of PSLV-XL Model, Funded by Vikram Sarabhai Space Centre (Rs. 3975588)
43. HEMT Modeling for Broad Temperature and Frequency Ranges, Funded by Space Technology Cell (Rs. 2260000)
44. Application of Meta-Material Mushroom Structure for Realization of Planar Single/Triple Passband Filter for Significant Size Reduction, Funded by Space Technology Cell (Rs. 2640000)
45. Investigation of Combustion and Soot Process in a Compression Ignition Engine Fueled with Biodiesel, Funded by Department of Science & Technology (Rs. 4344720)
46. Comprehensive Two & Three Dimensional Modelling of Water Permeation Across Proton Exchange Membrane in Fuel Cell Integrated with Electroosmotic Pump, Funded by Space Technology Cell (Rs. 2070000)
47. INSPIRE Faculty Award, Funded by Department of Science & Technology (Rs. 636400)
48. Ultrasensitive Thermal Spectrometer with Molecular Size and Mass Sensitivity, Funded by Space Technology Cell (Rs. 1800000)
49. Solvent Free Asymmetric Alphachlorination of Carbonyl Compounds and Oxidative Desymmetrization Reaction with Chiral IBXs with Mechanochemical Ball Milling, Funded by Science & Engineering Research Board (Rs. 3100000)
50. CSRDM Shroud Tube Hydraulics of Control Plugs in Fast Breeder Reactors, Funded by Indira Gandhi Centre for Atomic Research, Kalpakkam (Rs. 3314580)
51. Study of Electrodes in Organic Solar Cell for Efficiency and Reliability Improvement, Funded by Department of Science & Technology (Rs. 2714520)
52. Fabrication of 2-D and 3-D Microstructures for Sensor Applications Using Gray-Scale Maskless Lithography, Funded by DMSRDE, Kanpur (Rs. 965000)

53. Procurement of Book Based on IRHPA (Department of Science & Technology) Projects, Funded by Science & Engineering Research Board (Rs. 62500)
54. Training Workshop on Active Fault and Paleoseismology, Funded by Ministry of Earth Sciences (Rs. 750000)
55. A Study of the Complexity of Graph Reachability Problem, Funded by Department of Science & Technology (Rs. 700000)
56. INSPIRE Faculty Award, Funded by Department of Science & Technology (Rs. 700000)
57. Aerodynamic Study for Antennas Mounted on Dornier Aircraft, Funded by Chandrayanagutta, Hyderabad (Rs. 3000000)
58. The Structure and Dynamics of Groundwater Systems in North Bihar with Special Focus on the Koshi Megafan, Funded by International Centre for Integrated Mountain Development (Rs. 2602600)
59. FIST Support to BSBE, Funded by Department of Science & Technology (Rs. 48600000)
60. Wind Tunnel Study of Intake Tests on LCA Air Force MK 1 Model, Funded by Aeronautical Development Agency (Rs. 7506000)
61. Intelligent Tutoring System for Geometry, Funded by Science & Engineering Research Board (Rs. 1405200)
62. Integrated Geophysical Study in the East Geothermal Province Hats Belt, Odisha, India: An Insight into the Geotherma System and Tectonic Set up Funded by Department of Science & Technology (Rs. 3500000)
63. Design of Micropiles to Stabilize Railway Embankment, Funded by Research Design and Standard Organization, Lucknow (Rs. 656250)
64. Biomimetics of Acireductone Dioxygenase through Model Nickel and Iron Complexes. Funded by Science & Engineering Research Board (Rs. 3180000)
65. Hydrogenation, Dehydrogenation and Dehydrogenative Coupling, Funded by Department of Science & Technology (Rs. 4741000)
66. Advancing the Efficiency and Production Potential of Excitonic Solar Cells (APEX Phase II), Funded by Department of Science & Technology (Rs. 7698000)
67. Study on Personal Drone Benefit for Driver Assists, Funded by Renault Nissan Technology & Buiness Centre India Private Limited (RNT) (Rs. 1440000)
68. Microstructural Evaluation of Deformation and Recrystallization Behaviour, Funded by GE India Tehnology Centre Pvt. Ltd. India Tehnology Centre Pvt. Ltd. (GE) (Rs. 600000)
69. Investing the Role of Changes in Physicochemical Properties of Comentitious Materials on Long Term Performance of Stabilized Layers, Funded by Science & Engineering Research Board (Rs. 4670000)
70. Fiber-Optic Hydrophone Sensor Array for Underwater Surveillance, Funded by Naval Research Board (Rs. 5310464)
71. Hemilabile N-Heterocyclic Carbene (NHC) Ligands: Design Synthesis and Application in Organometallic Catalysis, Funded by Council of Scientific and Industrial Research (Rs. 900000)
72. Probing Surface Plasmon Mode Hybridization and Local Electromagnetic Field Distribution in Metal Nanoantennas using Single-Particle Level Spectroscopy, Funded by Council of Scientific and Industrial Research (Rs. 900000)
73. Uncovering the Roles Fat-Dachsous-Four-Jointed Cell Polarity Signaling Systems in Epithelial Wound Healing in Drosophila, Funded by Council of Scientific and Industrial Research (Rs. 2046000)
74. FIST Program, Funded by Department of Science & Technology (Rs. 68000000)
75. Removal of Volatile Organic Carbon by Functionalized Carbon Nano Composites, Funded by Council of Scientific and Industrial Research (Rs. 2246000)
76. Enantoselective Synthesis of Isoindolinones and Tetrahydroisoquinolines. Funded by Science & Engineering Research Board (Rs. 5330000)
77. Bridge Instrumentation Sytem Design for Bridge of Various Types, Spans and Age: Methodology Development and Validation for Damage Assessment in Standardized Railway Bridge Truss, Funded by Rail Vikas Nigam Limited Kanpur (Rs. 1774200)
78. Stereoselective Syntheses of Biologically Important Aza, Carba and Oxacyclic Compounds via Enolate Anions and Dianions, Funded by Department of Science & Technology (Rs. 4326000)
79. Development of Novel Visible Light Promoted Transformations, Funded by Science & Engineering Research Board (Rs. 4790000)
80. Photodiode Arrays for Near Infrared Detection and Tracking, Funded by Defence R & D Organisation (Rs. 6652800)
81. Studies on Heat Transfer During Condensation of Steam-Hydrogen Mixtures inside Closed Containments, Funded by Bhabha Atomic Research Centre (Rs. 2956000)
82. Water Soluble Transition Metal Complexes: Synthesis and Catalysis, Funded by Science & Engineering Research Board (Rs. 4526000)

83. The Study of Projective Normality of G.I.T Quotient Varieties Modulo Finite Group, Funded by Science & Engineering Research Board (Rs. 1423000)
84. Development of 2d Axisymmetric Metrial Thermal Response Code for Ablative Thermal Protection System of Reentry Bodies, Funded by Aeronautics R&D Board (Rs. 1247000)
85. Computational Intelligence Theories Applications and Future Directions, Funded by Science & Engineering Research Board (Rs. 150000)
86. Investigation of Stratified Turbulence and its Applications to Planetary Atmospheres. Funded by Planetary Sciences and Exploration Program (Rs. 3456000)
87. Investigation of Entropy Waves Assisted Combustion Intability and its Control in Gas Turbine Combustors, Funded by Gas Turbine Research Establishment (Rs. 3773600)
88. Design Innovation Centre, Funded by Ministry of Human Resource Development (Rs. 20000000)
89. Experimental Investigation of Aerodynamic Characteristics of Flexible Ram Air Parachutes with Varying Planform, Funded by Aerial Delivery Research and Development Establishment (Rs. 990000)
90. Collaborative Navigation of UAVs-UGVs in GPS Denied Environments, Funded by Defence R & D Organisation (Rs. 3000400)
91. Controlling Electronic Switching in Organo-Metallic Molecular Patterns at Solid-Liquid-Interface Using Scanning Electrochemical Tunneling Microscopy, Funded by Department of Science & Technology (Rs. 5500000)
92. Autonomous Flight Test of a Low RCS Aircraft Configuration with Ducted Fan for Multiple Flight Modes, Funded by Aeronautical Development Agency (Rs. 4664250)
93. Synthesis and Functional Studies of Novel Metal-Organic Frameworks based on Charged Pyrazolyl Carboxylates, Funded by Science & Engineering Research Board (Rs. 3650000)
94. Teaching and Learning Centre, Funded by Ministry of Human Resource Development (Rs. 26400000)
95. Review Meeting of IRHPA Project of RTDS Facility, Funded by Science & Engineering Research Board (Rs. 600000)
96. Development of Draft Protocol for Testing of Structural Components and Systems for use in Projects under Housing for All (Urban), Funded by Ministry of Housing & Urban Poverty Alleviation (Rs. 3133920)
97. Organic Chemistry PAC (SERB) Meeting, Funded by Science & Engineering Research Board (Rs. 300000)
98. Seed Money -TMIR (Technology Mission for Indian Railways), Funded by Technology Mission for Indian Railways (Rs. 480000)
99. Numerical Investigation of Soot Formation in Turbulent Diffusion Flames, Funded by Aeronautics R&D Board (Rs. 1954200)
100. Wetting Behavior of Fluids in Presence of Large Particles on Surfaces, Funded by Science & Engineering Research Board (Rs. 5937700)
101. Deployment of Brihaspati ERP, Funded by National Institute of Industrial Engineering, Mumbai (Rs. 300000)
102. Bio Inspired Attention Modeling for Anomalous Event Analysis, Funded by Defence R & D Organisation (Rs. 4980000)
103. Establishing a Critical Zone Observatory (CZO) in the Ganga Basin: Focus on Water Balance, Water Quality, and Hydrometeorological Information System, Funded by Ministry of Earth Sciences (Rs. 7464000)
104. RuTAG Sub Project (Design and Development of Amla Pricking Machine), Funded by Office of the Principal Scientific Adviser (Rs. 210000)
105. A Condition Monitoring System with Multi Agent Mechanism for External Non Contract Smart Inspection of Buried Oil and Gas Pipelines, Funded by the Petroleum Institute.
106. Developing and Validating the Algorithm Suitable for HVAC and Validation for Implementation at Design Stage. Funded by National Institute for R&D in Defence Shipbuilding (Rs. 852000)
107. Role of Neural Oscillations in the Processing of Behaviorally Salient Odors by the Mosquito Brain, Funded by Department of Biotechnology (Rs. 4523000)
108. Mechanism of Antibiotic Resistance by Class-C Beta Lactamase and NDM-1, Funded by Department of Biotechnology (Rs. 3150000)
109. FIST 2015, Funded by Department of Science & Technology (Rs. 39500000)
110. Cooperative Control for DC Microgrid, Funded by Science & Engineering Research Board (Rs. 2400000)
111. RuTAG Sub Project (Development of a Thermal Solar Dryer for Food Processing), Funded by Office of the Principal Scientific Adviser (Rs. 250000)

112. RuTAG Sub Project (Improved Horse Shoe Making Technology), Funded by Office of the Principal Scientific Adviser (Rs. 190000)
113. Programme Support on Translational Research on Biomaterials for Orthopaedic and Dental Applications, Funded by Department of Biotechnology (Rs. 1141000)
114. Integrated Nanophotonic Devices Operating at Room Temperature, Funded by Science & Engineering Research Board (Rs. 3800000)
115. Aero and Thermoacoustic Response of Premixed Burners, Funded by Science & Engineering Research Board (Rs. 2868100)
116. Quantum Key Distribution Using Magneto-Optic Interactions in Epitaxial Garnet Films, Funded by Department of Science & Technology (Rs. 530000)
117. Cross-Layer Optimization Techniques in Video Streaming over Wireless Fading Networks, Funded by Intel Technology India Pvt.Ltd. (Rs. 2250000)
118. Special Manpower Development Programme for Chips to System Design, Funded by Department of Electronics and Information Technology (Rs. 14751000)
119. Setting up of Electronics and ICT Academies, Funded by Ministry of Communication & Information Technology (Rs. 175000000)
120. Integrated Project on Active Fault Mapping in Kachchh Basin Western India, Funded by Ministry of Earth Sciences (Rs. 3625000)
121. Design of Compact Multi-Band Multi-Polarized Antennas for Wireless Communication Systems, Funded by Science & Engineering Research Board (Rs. 3638000)
122. Understanding Innate Responses to Odors and Odor Mixtures: Across-Species Integrated Approach, Funded by University Grants Commission (Rs. 21000000)
123. Development of Commercial Package for Restoration of Old Films and Videos, Funded by Zee Network (Rs. 500000)
124. Modeling Advanced FDSOI for IC Design, Funded by University of California Berkeley (Rs. 2640000)
125. Chemical Characterization of Organic Aerosols under Different Environmental Conditions, Funded by Indian National Science Academy (Rs. 1500000)
126. Experimental Investigation of Pressure Flow Deck Scour, Funded by Science & Engineering Research Board (Rs. 2201000)
127. Department of Science & Technology-INSPIRE Investigating the Lateralization of Attentional Processes, Funded by Department of Science & Technology (Rs. 700000)
128. Deployment of Zero Waste Toilets and Waterless Urinals in Magh Mela Allahabad, Funded by Ministry of Water Resources (Rs. 4516000)
129. Synthesis of Marine Natural Products Hapalindoles and their Analogues for SAR Studies, Funded by Ministry of Earth Sciences (Rs. 890000)
130. Research on Metal Organic Framework (MOFs): Searching of Paradigms for Selective and Reversible Hydrogen Storage at Ambient and Near Ambient Temperatures. Funded by Ministry of New and Renewable Energy (Rs. 6240000)
131. Stereoisomers of new Dipicolylamine Complexes from Multi-Component One-Pot Reactions: Isolation and Post Synthetic Modification Transmetallation and Bioinspired Hydrogen Production Catalysis. Funded by Science & Engineering Research Board (Rs. 6212030)
132. Development of Robotic Precision Planter, Funded by Indian Council of Agricultural Research (Rs. 110000)
133. Make in India Event (Mumbai), Funded by Ministry of Human Resource Development (Rs. 1000000)
134. Training on Moonj Grass Weaving, Funded by Wildlife Trust of India (Rs. 257000)
135. Ramanujan Fellowship Award, Funded by Science & Engineering Research Board (Rs. 3800000)
136. Off Design Engine Modeling of Aero Engines, Funded by Defence R & D Organisation (Rs. 4500000)
137. Identifying Fake Product Listings and Sellers, Funded by Flipkart (Rs. 330000)
138. Drainage Reorganization Paleoclimate Reconstruction and Sediment Sourcing in the (Paleo-) Yamuna Plains Using a Multi-Proxy Approach, Funded by Science & Engineering Research Board (Rs. 2929000)
139. Modeling and Simulation of III-V and Ge Transistors for Logic and Power Applications, Funded by Council of Scientific and Industrial Research (Rs. 1833300)
140. A Triggered Source of Single Photons and Photon Pairs, Funded by Science & Engineering Research Board (Rs. 15363040)
141. Development of a Reliable Computational Tool for Design and Performance Study of Aerospikes Nozzles at High Altitudes. Funded by Science & Engineering Research Board (Rs. 1370000)

142. Cooperative Communication in Cellular Networks Protocol Design and Performance Analysis, Funded by IIMA-Idea Telecom Center of Excellence (Rs. 600000)
143. Microstructural and Tribological Characterization of Stainless Steel 316L Obtained by Modulated Machining, Funded by Department of Atomic Energy (Rs. 7408700)
144. Stochastic Probability Density Function (PDF) Based Combustion Modelling Using Flamelet Generated Manifold (FGM) Tabulated Chemistry for Jet-In-Hot Coflow Flames, Funded by Department of Science & Technology (Rs. 2400000)
145. Modeling and Simulation of Methane Extraction from Gas Hydrates via Simultaneous Depressurization and CO₂ Injection, Funded by OIIB, Oil and Natural Gas Corporation Ltd. (Rs. 9972000)
146. Development of an Assisted Launch Unmanned Aerial Vehicle. Funded by Help Me Build Technologies Pvt.Ltd (Rs. 3996000)
147. Study of Tire Noise & Vibrations, Funded by CEAT Limited (Rs. 2112000)
148. Stability Analysis of Ring Shaped Understung Loads, Funded by Aeronautics R&D Board (Rs. 1505400)
149. KHEL (Knowledge Hub for E-Learning), Funded by Indian Institute of Technology Bombay (Rs. 8875000)
150. Development of FBG Based Laser Line Filters Centered at 532 nm and 1064 nm, Funded by Instruments R&D Establishment, Dehradun (Rs. 985000)
151. Ru-TAG: Solar Power Evaporative Cooler for Vegetable Storage, Funded by Office of the Principal Scientific Adviser (Rs. 215000)
152. Skill Formation and Self Employment Generation through Vocational Training, Funded by Indian Council of Social Science Research (Rs. 850000)
153. Promoting Innovations in Individuals Start-Ups and MSMEs (PRISM), Funded by Department of Scientific & Industrial Research (Rs. 1200000)
154. PRISM Monitoring Account, Funded by Department of Scientific & Industrial Research (Rs. 230000)
155. Experiments on Bypass Transition in Axisymmetric Boundary Layer, Funded by Science & Engineering Research Board (Rs. 4393200)
156. Three Application Areas of a Novel Hysteresis, Funded by Science & Engineering Research Board (Rs. 2010000)
157. Effect of Magnetic Field on Spinodal Decomposition- A Phase Field Study, Funded by Science & Engineering Research Board (Rs. 2966000)
158. Active Fault, Paleoseismic and Crustal Deformation in NW and Central Himalaya India: An Integrated Approach towards Seismic Hazard Assessment, Funded by Ministry of Earth Sciences (Rs. 29971600)
159. Boron Nitride Based Adsorbent for Removal of Arsenic from Aqueous Streams, Funded by Department of Science & Technology (Rs. 4260000)
160. Developing Prototype of a Smart Superconducting Fault Current Limiter (SCFCLSM) with Three-Dimensional Field and Current Mapping Technology for Early Fault and Hot Spot Detection, Funded by Department of Science & Technology (Rs. 13026000)
161. Central Sector Scheme for MOOC-Compliant E-Content Creation (NPTEL Phase IV), Funded by Ministry of Human Resource Development (Rs. 10000000)

Consultancy Projects

1. Flight Lab Training Program for Pvt. Engg College, Funded by Miscellaneous (Rs. 6871247)
2. Hydraulic Model Study of the Pipra Ghat Bridge, Funded by U. P. Public Works Department (Rs. 624200)
3. Clean Technology for Production Industries, Funded by WWF- India (Rs. 842700)
4. Study and Development of Lightweight Forging Process for Automotive Components, Funded by the Automotive Research Association of India (Rs. 561800)
5. Air Quality Monitoring of Twelve Air Pollutants, Funded by Central Pollution Control Board (Rs. 12542856)
6. Design and Development of a Dynamic Test Rig to Estimate Dynamic Derivatives of 1:20 Scaled Down Airship Configuration using Wind Tunnel Testing, Funded by Aerial Delivery Research and Development Establishment (Rs. 997760)
7. Wind Tunnel Study of one 275m Tall Chimney for 2x660MW Shree Singaji TPP (Stage-II), Funded by Larsen & Toubro Limited (Rs. 1539000)
8. Interdiffusion and Phase Growth Kinetics in the Fe-Al Based Alloys, Funded by General Motors USA (Rs. 33512)

9. Analysis of UPPTCL Tower Failure, Funded by UP Power Transmission Corporation Limited (Rs. 561800)
10. Vetting of Design & Drawings of Residential Building, Funded by Rudra Real Estates Lucknow (Rs. 168540)
11. Wind Tunnel Testing of Chimney & NDCT for 1*660 MW Ennore TPS at Chennai Funded by Lanco Infra Tech Limited (Rs. 2809000)
12. Vetting of Design and Drawing of 2MLD STP in Extended Aeration Technology, Funded by RCC Developers Limited, Meerut (Rs. 224720)
13. Wind Tunnel Study of Aeroelastic Model of NDCT for 2x500) MW Neyveli New TPS (TN), Funded by Paharpur Cooling Towers Limited (Rs. 1797760)
14. Plate Load Test & Block Vibration Test at the Site of Panki Thermal Power Station, Kanpur, Funded by Ventech Engineers (Rs. 505184)
15. Development of Cabin Pressure Control System for LCA, Funded by Hindustan Aeronautics Ltd (Rs. 1426000)
16. Restoring the Ganges: Healthier Rivers for Safer Water and More Productive Agro- Ecosystems, Funded by International Water Management Institute (Rs. 7510671)
17. Preparation of Adequacy Report for Sludge Generation in Model Tanners India Pvt.Ltd, Funded by Model Tanners (India) Pvt.Ltd (Rs. 171000)
18. Intergranular Fracture Determination using Fractal Method, Funded by Bharat Heavy Elect Ltd (Rs. 64125)
19. Review of Base-Isolation Design of Apartment Buildings at Bharuch, Funded by SLD Infrastructure (Rs. 1200000)
20. MOOCs for Development, Funded by Common Wealth of Learning, Vancouver, Canada (Rs. 750000)
21. Vetting of DPR of 137MLD STP at Greater Noida, Funded by U.P.Rajkiya Nirman Nigam (Rs. 625503)
22. Antenna Design for Water Meter, Funded by CMC Limited (Rs. 250000)
23. Video Analyser, Funded by LG Soft India Private Limited (Rs. 1200000)
24. Improving Rheological Behaviour of Agro-Products, Funded by United Phosphorus Limited (Rs. 855000)
25. Construction of S.T.P at Industrial Area-Sandila Distt-Hardoi, Funded by UP State Industrial Dev.Corpora (Rs. 182400)
26. Sewerage System and Water Supply Scheme for Industrial Area Trans Ganga City Distt.Unnao, Funded by UP State Industrial Dev.Corpora (Rs. 136800)
27. Wind Tunnel Study of Aeroelastic Model of NDCT for 2x660 MW Shri Singaji TPP, L&T Malwa, Funded by Paharpur Cooling Towers Limited (Rs. 1824000)
28. Structural Design & Vetting of Hanger No.2 Amausi Airport Lucknow, Funded by U P Jal Nigam (Rs. 228000)
29. Detection/Tracking of Low SNR Target in IR/CCD Image Data, Funded by VEM Technologies Pvt.Ltd (Rs. 375000)
30. Prompt Gamma Neutron Activation analysis Feasibility Study, Funded by Titan Company (Rs. 92625)
31. Designer Peptide: Nucleic Acid (PNA) and Peptide Synthesis and Glycosylation Analysis towards Understanding Links between Molecular Structure and Function, Funded by Unilever Limited (Rs. 4873500)
32. Vetting of Design and Calculation of 6 MLD STP at Meerut, Funded by RCC Developers Limited, Meerut (Rs. 684000)
33. Technology Management, Best Practices & Impact Assessment of R&D Projects of RDSO, Funded by R.D.S.O. (Rs. 2536458)
34. Study of Structural Distress in Yamuna Bridge at Hamirpur on NH-86 and Suggestions for Remedial Measures., Funded by PNC Kanpur Highways Limited (Rs. 3000000)
35. UPSIDC, Funded by UP State Industrial Dev.Corpora (Rs. 99750)
36. Software Development Work Using HPC Cluster Architecture, Funded by National Botanical Research Institute (Rs. 1500000)
37. Raising of Ash Dyke Height at STPS Sarni, Funded by M.P.Power Genrating Company Ltd. (Rs. 1425000)
38. Consultancy for Evaluating the Structural Adequacy of old Arch Railway Bridges between Kanpur and Jhansi, Funded by Rail Vikas Nigam Limited Kanpur (Rs. 192375)
39. Real Time, Multi-Model Sensor Data Fusion and Deep Learning Techniques for Autonomous Vehicles-Phase I, Funded by Ford Motor Company (Rs. 9969000)
40. Continued Interaction & Industry Oriented Student Project, Funded by Hector Beverages P Limited (Rs. 100000)
41. Video Compression for SSD AVRs, Funded by Hindustan Aeronautics Ltd (Rs. 1495792)
42. Proof Checking for Bridge DPR of Baxana Bridge (PIU-Dhar-I) for MPRDA Bhopal, Funded by Madhya

- Pradesh Rural Development Authority (Rs. 178125)
43. Consultancy on Design Thinking for ENTER, Funded by U Education Management Private Limited (Rs. 72105)
 44. Experimental Investigation on Aerodynamic Stability and Estimation of Wind Loads on A-Frame at the National Salt Satyagrah Memorial at Dandi, Funded by Indian Institute of Technology Bombay (Rs. 778620)
 45. Development of Encryption Algorithm, Funded by Indian Air Force (Rs. 2700000)
 46. Third Party Quality Inspection of JPNIC, Gomti Nagar Lucknow, Funded by Lucknow Development Authority (Rs. 2907000)
 47. Characterization and Simulation of the Performance of Twin-Fluid Atomizers, Funded by Hindustan Petroleum Corporation Limited (Rs. 3384000)
 48. Technical Assessment of Drainage Design & Rainwater System, Funded by U.P.Small Industry Development Corpn (Rs. 156750)
 49. Consultancy Regarding Study of Geotechnical Characterization at the Site of Lucknow Residency Building Lucknow, Funded by Archaeological Survey of India (Rs. 128250)
 50. Consultancy Project for Improvements in Pouch Filling and Capping Processes, Funded by Hector Beverages P Limited (Rs. 500000)
 51. Trans Ganga City, Funded by U.P.Small Industry Development, Corpn (Rs. 299250)
 52. Consultancy for Vetting the Estimate, Funded by U.P.Small Industry Development Corpn (Rs. 6907002)
 53. Site Visit and Review of Ashdyke Design, Funded by Hindustan Powerprojects Private Limited (Rs. 228000)
 54. Consultancy Regarding Study of Subsoil Characteristics for Construction of Over Head Tank and Under Ground Tank at Trans Ganga City Distt.Unnao, Funded by UP State Industrial Dev.Corpora (Rs. 811965)
 55. Fabrication of Scaled Perspex Water Model Tundish, Funded by Hi Tech Chemicals (Rs. 926250)
 56. Analysis and Interpretation EC-OC and Their Fraction, Funded by NUS Singapore (Rs. 211250)
 57. Understand the Structure -Property Relationships of Liquid Tea Concentrates via Rheology, Funded by Unilever Limited (Rs. 1296750)
 58. Hydraulic and Geotechnical Investigation of Ganga and Kalyani River Bridges at Bithoor, Funded by U.P. State Bridge Corporation (Rs. 1076700)
 59. Bi-Axially Oriented Polypropylene, Funded by Cosmo Films Limited (Rs. 100000)
 60. ICME-AHSS, Funded by Tata Consultancy Services
 61. Understanding Effect of Composition Processing and Ageing of Cleaning Compositions on Rheology, Funded by Unilever Limited (Rs. 1311000)
 62. Wind Tunnel Study for Major Bridge over River Hooghly at Kalyani West Bengal Second Iswar Gupta Setu, Funded by WBHDCL (Rs. 3306000)
 63. Learning Enhancement Programme, Funded by the Boston Consulting Group (I) Private Ltd. (Rs. 192000)
 64. Site Visit in Connection with Consultancy for Designing the Approach Road (Embankment) and Protection Work on River Yumuna at Pal Ghat in Jalaun District U.P, Funded by PWD (Rs. 49875)
 65. Vetting of Design of Stadium at Jhansi, Funded by U.P.Rajkiya Nirman Nigam (Rs. 200000)
 66. Qualcomm Wireless Short Course, Funded by Qualcomm (Rs. 365890)
 67. Wind Tunnel Testing of 69 m Tall Reinforced Single Flue Steel Lined Chimney for VAPI, Funded by Shree Vijaya Engg. & Construction Pvt.Ltd (Rs. 1100000)
 68. Wind Tunnel Study of 275 m Tall Chimney for 2x660MW Khargone STPP at MP, Funded by Larsen & Toubro Limited (Rs. 1539000)
 69. Wind Tunnel Model Study of Bridge No 130 in Tupul Jiribum, Funded by STUP Consultants Pvt. Ltd (Rs. 1800000)
 70. Consultancy-Aarti Industries Limited, Funded by Aarti Industries Limited (Rs. 1417248)
 71. Miscellaneous Site Visit Project, Funded by Miscellaneous (Rs. 35625)
 72. Socio-Economic Study on Neighbourhood Area of Panki Thermal Power Station, Funded by up Rajya Vidyut Utpadan Nigam Ltd. (Rs. 700000)
 73. MOOCs for Development, Funded by Common Wealth of Learning, Vancouver, Canada (Rs. 750000)
 74. Vision Document of RSAC, UP & CST UP, Funded by Council of Science & Technology (Rs. 360000)
 75. Design and Simulation of Receiver Algorithms for Spread Spectrum Based Physical Layer for Advanced Data Link, Funded by Ministry of Defence (Rs. 850350)
 76. Wind Tunnel Test for Rayalaseema NDCT & Chimney, Funded by Gammon India Limited (Rs. 2809000)
 77. Electromagnetic Field Study for 66KV Transmission Line Having Covered Conductor, Funded by Electrical Research & Development Association (Rs. 42750)

78. Verification of Technical Specification for High Mast Solar Street Lights, Funded by UPNEDA (Rs. 35625)
79. UPSIDC Concrete Roads, Funded by UP State Industrial Dev. Corpora (Rs. 213750)
80. Site Visit in Connection with work at the site of Maita for Technical Discuss, Funded by Tata Aldesa (JV), DFCCIL Lot 101 Kanpur (Rs. 25673)
81. Consultancy for Detailed Study of Soil Properties at the Side of Obra Thermal Power Station, Obra, Sonbhadra UP, Funded by Ventech Engineers (Rs. 512573)
82. Consultancy for Design of Substructure Strengthening for 7 old Arch Bridges in Connection with Doubling of Tracks Between Kanpur -Jhansi, Funded by Rail Vikas Nigam Limited Kanpur (Rs. 1001875)
83. Consultancy for Complete Geotechnical Investigations for 7 old Arch Bridges in Connection with Doubling of Tracks Between Kanpur Jhansi, Funded by Rail Vikas Nigam Limited Kanpur (Rs. 1381156)
84. Cyber Security Course, Funded by National Technical Research Organization (Rs. 250000)
85. Structural Analysis of Different Airship Components, Funded by Aerial Delivery Research and Development Establishment (Rs. 986100)
86. Evaluation of Structural Adequacy and Strengthening Measures, if any, for 7 old Arch Bridges in Connection with Doubling of Tracks Between Kanpur-Jhansi., Funded by Rail Vikas Nigam Limited Kanpur (Rs. 1423378)
87. Consultancy Work on Upgradation, Expansion and Redesigning of 33/11/0.4 KV Substations/Network, Funded by Indian Institute of Information Technology (Rs. 798000)
88. Study on Inclusions in Steel Castings, Funded by Mahindra Sanyo Special Steel Pvt. Ltd. (Rs. 57250)
89. Wind Tunnel Test for Chimney of Kothagudam, Funded by Bharat Heavy Elect Ltd (Rs. 1254000)
90. Wind Tunnel Test for Chimney of Bhadradri, Funded by Bharat Heavy Elect Ltd (Rs. 1254000)
91. Consultancy Project (UPSIDC), Funded by U.P.Small Industry Development Corpn. (Rs. 157438)
92. Synthesis, Characterization and Properties of Al-Ti Alloys, Funded by Gharda Chemicals Limited (Rs. 146216)
93. Site Visit of Resolving Non Conformity Reports (NCR) at Different Structures, Funded by Tata Aldesa (JV), DFCCIL Lot 101 Kanpur (Rs. 178906)
94. Development of a Control Architecture for a Zone Less Induction Cook -Top, Funded by GE India Technology Center Pvt Ltd (Rs. 2100000)
95. UPSIDC Consulting Works, Funded by U.P.Small Industry Development Corpn (Rs. 2500000)
96. Vetting of Estimate for Transganga City-Unnao Earthwork and Slope Clearance, Funded by U.P.Small Industry Development Corpn. (Rs. 286250)
97. Topographical Survey Using Drone for Mandasaur Solar PV Projects, Funded by NTPC Limited (Rs. 798750)
98. To Reduce Ladle Balance by 1 Tonne During Teeming into Tundish and thereby Improve Plant Productivity, Funded by Rashtriya Ispat Nigam Limited (Rs. 2418240)
99. Evaluation of Materials Fe-415 Steel Engineering Properties as per IS1786, Funded by Irrigation Deptt UP (Rs. 578225)
100. Socio-Economic Study on nearby Areas of the Proposed Jawaharpur Thermal Power Project, Funded by UP Rajya Vidyut Utpadan Nigam Ltd. (Rs. 903000)
101. Review of Design of Stone Pitching for Slope of Expressway, Funded by Strata Geosystems (India) Ltd (Rs. 229000)
102. Design & Development of Intelligent Electronic Transformer, Funded by NTPC (Rs. 8238275)
103. Stress Induced Optical Attenuation and Degradation in Optical Fibers, Funded by Sterlite Technologies Ltd (Rs. 2565000)
104. Development of Unmanned Aerial Vehicles (UAV) Aided Driver Assistance System, Funded by Renault Nissan Technology & Business Centre India Private Limited (Rs. 2467000)
105. Consultancy for Field Tests at the PNB Circle Office Building, Birhana Road Kanpur, Funded by Punjab National Bank Birhana Road Kanpur (Rs. 314875)
106. Feasibility Study on the Development of Hydrophobic Coating Materials for Minimization of Steam Turbine Blade Erosion due to Droplet Impact, Funded by Bharat Heavy Elect Ltd (Rs. 772875)
107. Development of a Computer Model for Predicting Performance of Water Purifiers, Funded by Filtrex Technologies Pvt. Ltd (Rs. 422219)
108. Consultancy for Study of Sub Grade and Blanket Material Characteristic for Design of Formation for Heavy Axle Load at Bhaupar-Etawah Railway Track, Funded by Tata Aldesa (JV), DFCCIL Lot 101 Kanpur (Rs. 864017)

109. Making of Cake from Lead Grids, Funded by Verdeen Chemicals, Ghaziabad (Rs. 214688)
110. Vetting of Structural Design of Hotel Ramada at Varanasi, Funded by VAM Consulting Engg. & Architects (P) Ltd. (Rs. 472313)
111. Holistic Scene Understanding, Funded by Samsung (Rs. 1674563)
112. Voltage and Current Harmonic Compensation Using Static Voltage Regulator, Funded by Emerson Network Power (India) Private Limited (Rs. 427500)
113. Fluid Structure Interaction Studies of Aerostat Envelope, Funded by Aerial Delivery Research and Development Establishment (Rs. 983250)
114. Inspection of Works at Lucknow for Regional Transport Office, Funded by U P Jal Nigam (Rs. 56180)
115. Socio-Economic Study on nearby Areas of the Obra Thermal Power Station, Funded by UP Rajya Vidyut Utpadan Nigam Ltd. (Rs. 950000)
116. UAV Data Acquisition and Processing, Funded by Indian Institute of Remote Sensing (IIRS) Dehradun (Rs. 1500000)
117. Analytical Study of a Supercavitating Projectile Including Stability Analysis in Different Mediums, Funded by Defence R & D Organisation (Rs. 5744175)
118. Vetting of Estimate for the Creation of Parks at Trans Ganga City-Unnao, Funded by U.P. Small Industry Dev. Corpn. (Rs. 143125)
119. Construction of Tubewell and Pump House, Funded by U.P. Small Industry Dev. Corpn. (Rs. 114500)
120. Thermomechanical Test of some Alloy Samples at Various Temperature Conditions. Funded by Honda R&D (Rs. 157438)
121. Consultancy from Multiple agencies for the Central Cryogenics Facility, Funded by Miscellaneous
122. Site Visit & Inspection of Severely Deteriorated Residential Buildings at Shalimar Bagh New Delhi, Funded by Tata Power Delhi Distribution Limited (Rs. 91600)

1. Project Name : Towards benchmarking of Information and Technology modules in Physics and Chemistry

Project Investigator: Prof. R. K. Thareja

Co-Investigator(s): Prof. Gurunath Ramanathan
(Chemistry)

Project Initiated on: 17/04/2009

Approval letter and date: F.16-49/2009-DI dated 31.03.2009

Project Objectives

Benchmarking of Information and Communication Technology Modules in Physics and Chemistry. This project is at core of UG, PG teaching and curriculum development and has proposed to provide content along with a large number of interactions through wiki format and also the development of a large number of simulations in physics and chemistry. Objectives as stated in the DPR: 5 courses each in Physics and Chemistry were to be completed as stated in the original DPR and approved by the project review standing committee (PRSG). This corresponds to roughly one semester course work of the M.Sc. PG program. This was revised to 17 courses in Physics and 13 in Chemistry after seeing our progress.

Progress report

All The courses have been completed. The latest course is Mathematical Methods in Physics and this has also been reviewed. Some courses are under review. All project operations are expected to cease shortly. There is money left in the project.

Highlights

This project exceeded the original objectives and has delivered 17 courses in Physics and 13 courses in Chemistry. Revision of some courses was also done after receiving referee feedback.

2. Project Name: Knowledge Incubation Centre

Project Investigator: Prof. C. S. Upadhyay

Project Initiated on: 03-06-2013

Approval letter and date: 16-30/2012-TS VII 28-03-2013

Project objectives

Primary goal of KIT is to enable the various institutes in the country meet the demand of teaching manpower and technology creators through dissemination of knowledge and know-how to teachers, researchers and students. The main objectives are:

- Strengthening Institutions to produce high quality engineers for better employability
- Scaling-up postgraduate education and demand-driven Research & Development and Innovation
- Establishing Centers of Excellence for focused applicable research
- Training of faculty for effective Teaching
- Enhancing Institutional and System Management effectiveness

Progress report

KIT, IIT Kanpur organized several workshops, schools, short term courses, discussion on curriculum and summer and winter internship program, a visiting researcher program and some e-learning courses in the year 2015-2016. The following activities were conducted:-

1. Workshop on Electromagnetic Theory (May 01 - 05, 2015)
2. Workshop on Effective uses of EdRP Components (June 26 - 27, 2015)
3. Short Course On Basic Physics for B.Sc students (June 29 - July 11, 2015)
4. Summer Internship & Visiting Researcher Program 2016 (May 10 - July 24, 2015)
5. TEQIP School on System & control (August 4 - 9, 2015)
6. A short term course on Micro manufacturing (August 31- September 04, 2015)
7. TEQIP workshop on Materials & Metallurgy Curriculum Discussion (October 08 - 09, 2015)
8. TEQIP workshop on Microstructure via Heat Treatments (October 19 - 21, 2015)
9. Winter Internship & Visiting Researcher Program 2016 (December 1 - 23, 2015)
10. TEQIP Workshop on High Resolution X-Ray & Electron Diffraction (February 1-05, 2016)
11. Pravartana 2016: TEQIP Symposium on Mechanics (February 12-14, 2016)
12. Short term course on Research Skills & Methods (February 19-21, 2016)

13. TEQIP Workshop on Advanced Robotics (March 15-19, 2016)

Highlights :

- Student Internship and Visiting Researcher Program has been very successful and some of them have even led to publications in international journals.
- A good pool of resources **like recorded video lectures** have been developed and are available on the **KIT, IITK webpage**.
- **Good network established** with Quality Circle institutions with a better understanding of the specific area of weakness where things can be improved.

3. Project Name: Central Sector Scheme for MOOCs Compliant E-Content Creation (NPTEL IV)

Project Investigator: Prof. Satyaki Roy

Project Initiated on: 31/03/2016

Approval letter and date: 08/03/2016

Project Objectives

NPTEL is a joint initiative of the MHRD and the seven IITs and IISc Bangalore. The operational objective of NPTEL is to make high quality learning material available to students of Engineering & Science Institutes and Colleges and Universities across the country by using the advances in communication technology. The target group consists of students and faculty members of institutions offering undergraduate & graduate Engineering/ Science/ Management/Humanities & Social Sciences programs in India.

Progress Report

IIT Kanpur has developed 18 courses between January-April, 2016. With this, IIT Kanpur has reached a landmark of completing 50 courses since January 2015. Coming semester, starting July 18th, 30 courses are being developed by the faculty members at IIT Kanpur. Since January 2016, 38 colleges have been given NPTEL course contents duly copied from our office. Besides this, IIT Kanpur has completed text transcription of 11 courses as well. We plan to complete text transcripts of another 6 courses within the year. Since January, 2016 a fund of Rs.3,58,65,000 (Three Crores Fifty Eight Lakhs and Sixty Five Thousand) has been received from IIT Madras for developing the above mentioned 48 courses.

Highlights

- Largest numbers (30 courses) are being offered this semester (July-November, 2016).
- Highest number of enrollments (8318) in the course

titled “Developing Soft Skills & Personality” being developed by Prof. T.Ravichandran.

- 84 colleges from Uttar Pradesh, Madhya Pradesh, Chhattisgarh, Bihar, Rajasthan, Uttarakhand and West Bengal have become local chapters since January, 2016.

4. Project Name: Design Innovation Centre

Project Investigator: Koumudi Patil

Project Initiated on: 02-11-2015

Approval letter and date: 30-09-2015

Project Objectives

Ministry of Human Resource and Development has funded the establishment of a Design Innovation Centre at IIT Kanpur to promote a culture of innovation and creative problem solving. The Centre aims to facilitate interdisciplinary design-focused education, research, and entrepreneurial activities, besides encouraging partnerships between academia and industry for commercialization of technology.

Progress Report

1. Constitution of an internal Project Appraisal and Administrative body (PAAB) After intense discussions, the Institute has set up a PAAB as the apex decision making body of DIC to ensure the widest possible reach of DIC activities in all quarters of the Institute, and to effectively disburse the DIC funds amongst all stakeholders.

The following members have been appointed in this body which came into effect on April 6th, 2016.

1. Prof. M. Agrawal, CSE- Chairperson
2. Prof. S. Roy, HoD-DP- Convener
3. Prof. A. Chandra, DoRD
4. Prof. V. Panigrahi, HoD-ME
5. Prof. A. Upadhyay, HoD- MSE
6. Prof. S. Sinha, HoD- HSS
7. Prof. K Patil, PI- DIC

2. Call for Project Proposals for funding under DIC

In order to ensure a culture of innovation amidst all quarters of the Institute, bring in inclusivity, and encourage excellence, three call for proposals have been sent out.

- a. 23 Project proposals from Institute Faculty and staff from which 9 were awarded funds in the first phase.
- b. 11 Project proposals from Design Programme students from which 3 were awarded grants in the

first phase.

3. Lab development: Two labs are being set up to support both low and high fidelity prototyping. The first draft of a list of machines to be procured has been suggested for Product Design Lab and Communication Design Lab

4. Course Curriculum: Broad areas and levels have been identified.

A call for course proposals will be issued in July. Courses will begin in the January semester.

5. Website Design: The DIC website has been launched. Content on the site will be uploaded as the project progresses.

Please access it at the following link-
<http://dcubeiitk.com/>

6. The MoU between the Hub and Spoke has been confirmed. Discussions on all clauses have been completed with the three spokes. The status of the same is as follows

- 1- IARI has signed the MoU. IIT Kanpur is in the process of signing the copy.
- 2- HBTI has agreed to signed the MoU without any changes.
- 3- SGPGI has agree to sign the MoU with an addition of one clause.

Highlights

- 1- Nine faculty projects and 3 student projects have been sanctioned in year 1.
- 2- Three esteemed engineering and medical science institutes will be mentored by IIT Kanpur under this initiative- SGPGI, HBTI and IARI.

5. Project Name: Teaching and Learning Centre

Project Investigator: T.V.Prabhakar

Con-Investigators: Ajit Chaturvedi, Chandrasekhar Upadhyay

Project Initiated on: November 2015

Approval Letter and date: F.NO.3-13/2015-PN.II
Dt. 30-09-2015

Project Objective

The Teaching and Learning Centre will work at multiple

levels: at Teacher Enablement and Quality Improvement; Curriculum Audit, Curriculum Design, Curriculum Adoption Strategy; design and develop powerful electronic platforms to enable the above the two modes of interaction.

Progress Report

Infrastructure for generating and hosting of electronic content has been created. A private cloud facility for hosting multiple eCourses has been set up. This system can simultaneously support up to 40 courses. This can be seen at <http://tlc.iitk.ac.in/>.

This portal will play the host of all electronic course offerings from IIT Kanpur.

We started collaborations with BHU-IIT and UPTU Lucknow. Conducted a workshop on MOOCs at BHU and trained about 20 faculty members on MOOCs and related technologies. Based on this program, they would be starting their online offerings soon. With UPTU Lucknow, a brain storming session was held with representatives (Deans and other Administrators) from 8 different colleges. Several suggestions came up which are being followed.

Information about the release of funds for the second year will greatly help.

Highlights

1. Portal up and running: <http://tlc.iitk.ac.in/>
2. Conducted a Workshop on MOOCs at BHU
3. Collaboration with UPTU Lucknow initiated

6. Project Name : National Program for Technology Enhanced Learning

Project Investigator: Prof. Satyaki Roy

Project Initiated on: 28th August, 2009

Approval letter and date: F.26-4/2007-TS.I/DL
dated 31st March, 2009

Project objectives

NPTEL is a joint initiative of the MHRD and the seven IITs and IISc Bangalore to promulgate quality education among the engineering colleges of the country through video and web based learning material in disciplines of Engineering, Sciences and Humanities. This aims to bring knowledge to almost everyone's doorstep and also fill the gap that exists between the current expertise level of faculty members in institutions of higher learning such as the IITs/IISc and those in private and other government aided engineering institutions and universities in India.



Progress Report

There are 117 video and 126 web based courses from phase I and about 600 courses were proposed to be developed by the end of phase II. Among these 600 courses, 138 courses are being developed by IIT Kanpur. Out of these 138 courses, 120 have been posted live on the NPTEL Portal, while five courses are in the pipeline to be uploaded, 6 courses are under review and 8 courses are being edited. For 2 courses, the Subject Matter Experts have completed recording of over 75% of the lectures.

Highlights

1. The initial commitment was for developing 80 courses however IIT Kanpur has successfully developed 138 courses covering all disciplines of Engineering, Sciences, Humanities and Management.
2. Additionally IIT Kanpur developed and offered 32 courses online (MOOCs)
3. So far IIT Kanpur has received Rs.13,23,20,600/- (Thirteen crores twenty three lakhs twenty thousand and six hundred only) as against the original sanction of Rs. 11,73,60,600/- (Eleven crores seventy three lakhs sixty thousand and six hundred only). Rs 1 crore was also received in September 2015 to cover up the expenses for the additional courses.

7. Project Name: Virtual Lab – Phase II

Project Investigator: Prof. Kantesh Balani

Project Initiated on: 07/11/2014

Approval letter and date: 19 Aug. 2014 (Funds transferred by Sept. 23, 2014, and funds actually realized by Nov. 06, 2014)

Project Objectives

In Phase-II of Virtual Lab, idea is to make all the developed labs into an open source repository that is available to community/academic institutes, whether in India or abroad, for use and development. The idea is now to convert all the licensed content into a platform that is independent of any licensed software. Further, a target of creating nodal centers and achieve a target participation of 54,000 users in the current year.

Progress report

A user count of 1,04,422 is obtained till Apr. 2016 (see Appendix 1). This is almost double of the targeted user count. The release of the funds for the second year is awaited. A total of 15 workshops have been conducted. A total of 19 nodal centers have been created with affiliation to IIT Kanpur.

lagging in terms of creating nodal centers. Overall summary:

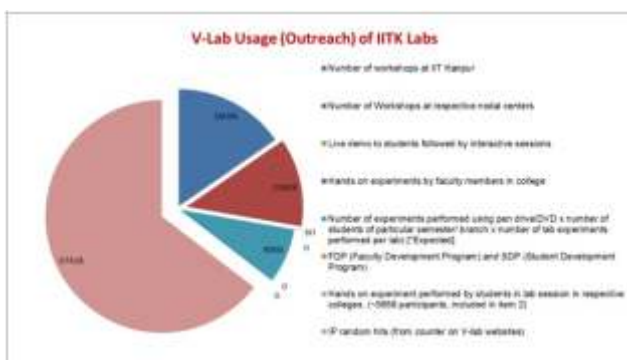
1. Phase II of Virtual Lab has started (since Oct. 2014).
2. The target of taking 3 labs to level six was decided. The list of current stats of virtual labs is provided in Appendix 2 (target achieved).
3. One regular project engineer, one project associate and one ad-hoc personnel are hired for the project development.
4. The undertaking for integration of all labs (worked upon by IIIT Hyderabad) at common platform is being supported by IIT Kanpur.
5. Next step is to change Lab-View content to open source using Sandhi (developed by IIT Bombay)

Highlights

1. Five labs have been hosted, and six labs have achieved FOSS level 6. Next step is to change Lab-View content to open source using Sandhi (developed by IIT Bombay). The undertaking for integration of all labs (worked upon by IIIT Hyderabad) at common platform is being supported by IIT Kanpur.
2. One regular project scientist, one technician and one ad-hoc personnel are available for the project development.
3. Currently, the number of nodal centers is 19, and needs an increase to ~24 nodal centers. The user count (of 1,04,422) has substantially exceeded the targeted count (of 54,000).

Outreach User Count

Outreach Activities for Collecting Usage Data by IIT Kanpur on Actual Basis (for workshops at IIT Kanpur, and approximate basis for outside IITK) till Apr. 2016.



Target of achieving required users is achieved, but we are

List of Labs at IIT Kanpur

Sr.No.	Lab Name	(Lab-ID)	PI Name	Level
1	Virtual Astrophysics Lab	PHY01	Dr. P.K.Jain	6
2	Ultrafast Laser Spectroscopy	CHS13	Dr. D.Goswami	6
3	Material Response to Micro-structural, Mechanical, Thermal & Biological Stimuli	MECH08	Prof. Kantesh Balani	6
4	Aerospace Virtual Lab	–	Prof. S.Kamle	6
5	Virtual Combustion and Automization Lab	–	Prof. D.P.Mishra	6
6	RF and Microwave Characterization Lab	ECE18	V. Srivastava, J. Akhtar	0
7	Transducers and Instrumentation Virtual Lab	ECE03	Dr. N.K.Verma	1
8	General Purpose Production Simulation Lab	–	Prof. D. Philip	6

8. Computer Centre

Computer Centre at IIT Kanpur is a central facility that caters to the computing needs of the faculty, staff and students for their research, development and teaching. It provides several services like e-mail and web access. It currently supports more than 10000 users. The Institute has a fully managed Local Area Network of more than 20000 nodes, connecting all the hostel rooms, offices and residences over wired as well as wireless network of more than 700 points. It has 3Gbps connectivity to the Internet via different internet service providers. Computer Centre has been upgrading its computing, mail, network, Internet, PC lab and overall infrastructural facilities in a major way over past few years. The computer centre functions round the clock on a state of art data centre divided into various zones that host compute and other servers, parallel clusters for different projects, office automation services, soft switch based telephony services and network services. The Computer Centre has two High Performance Computing setups, which have ranked 369 and 130 in top 500 lists (www.top500.org), in the November 2010 and June 2013 lists respectively. The second cluster became ranked 118 in the top 500 lists in June 2014 with the addition of extra nodes. Together, these setups have 1373 nodes. There are labs with over 400 computers. The labs and the computational infrastructure hosts a wide variety of general as well as specialized application software in areas like simulation, modeling, data management & processing, CAD/CAM, computer graphics, word processing etc. Several software are also hosted on central servers for use by students and faculty on their own computers. Activities of 2015-16 include the following:

- The primary and secondary Internet links were both upgraded from 1Gbps (1:2) without rate limit to 1Gbps (1:1) whereas the NKN link

remained at 1 Gbps (1:1).

- LDAP based authentication was started with a smooth migration from NIS to LDAP.
- HPC machines bought in 2010 were upgraded to the latest operating system, and the Lustre file system was upgraded.
- Infiniband network on machines bought in 2013 and 2010 was revamped.
- The scheduler and several software on the HPC machines were upgraded.
- Several software on servers were upgraded.
- The main data centre was provided with a dual cooling circuit and its operations and maintenance was revisited.
- Virtual machine as a service was initiated.
- Certificate deployment based on *.iitk.ac.in domain names was started.
- Password change via web was made available.
- Authentication of guests on WiFi was initiated via SMS in guest house and auditorium.
- LAN was provided in Hall-12 and Wifi as well as LAN was provided in new LHC, L-18, 19, 20.
- NOIDA VH network was set up along with WiFi and Telephony.
- All hostel network switches were put on UPS.
- Round Cube mail client was started.
- WiKi for IIT Kanpur Web Services was started
- Joomla based website and backend support was started.

9. ERP mission (MHRD/EE/20100117) also called EdRP Mission

NMEICT initiated the EdRP mission in NMEICT. AMU Aligarh, AVV Kochi, DEI Agra, IGNOU Delhi, IIT Roorkee, JMI Delhi, NIT Hamirpur, SMVDU Jammu and IIT Kanpur (as coordinating institute) were

given the responsibility for development. The objectives of the project were to build, deploy and manage open source web based software systems for Indian academic institutes. At that time, IIT Kanpur was developing a learning management system called Brihaspati. In order to leverage on this ongoing development, the entire ERP system was planned to be built around it. With the help of other institutes, the other modules were identified and each partner institute developed one or more of these modules. The basic philosophy of 'release as early as possible' was followed since its initiations, so that the systems get tested by the actual users and their feedback can be used to enhance the system. The users' participation in the design process in this manner ensures that the important features are developed first and resources are not wasted on features which will have much less use.

Each system was planned such that all academic institutes can create their own partitions and use it for their own purpose. For the userid of users, all other modules were designed to use email id as their logins, as email ids are unique for a user irrespective of his organization. Brihaspati-2 was modified to use email id in this process. To ensure that all the systems use same userid and password, we have implemented openid based authentication system from Gmail and Yahoo. Also, authentication using a customized remote authentication mechanism from Brihaspati-3 server have been implemented. Single signon for all the services have thus been implemented. All the source code developed under this project is maintained as publicly visible subversion repository at <http://brihsvn.iitk.ernet.in/repos>. The source code builds are also distributed world wide from <http://sourceforge.net/projects/brihaspati> under an open source license. In the working draft, all the developers add their documentation. All the changes done by various developers are merged with main working draft and are kept in a publicly accessible ERP mission area on <http://brihaspati.nmeict.in/brihaspati/servlet/brihaspati>. The working draft documentation keeps on evolving and currently consists of seven volumes. Recently, the user documentation for Brihaspati3 in Hindi and new working draft on Brihaspati4 a p2p LMS framework has also been added.

Currently following modules are available: Brihaspati-3 – (<http://brihaspati.nmeict.in/brihaspati/servlet/brihaspati> - has 277 institute partitions, Local installations are not counted in this.), MHRD Multisite Grant Management System (MGMS) - superseded by BGAS lately, Data Visualization System - taken care of by the analytics part of Brihaspati3 lately, Project Management

System, Online Admission System, Course Management System (basically handles the registration of students in various courses every semester), Online Examination System (is part of Brihaspati-3 and is used extensively in

IIT Kanpur), Payroll Management System, Purchase and Inventory Management, Library Automation, and Online Election Management. As per the requirements identified in various meetings, now Brihaspati general accounting system (BGAS) with funds based accrual accounting with double entry is also in release. The standard chart of accounts and budget control mechanisms have been developed and added to the system. Automated depreciation calculation of assets, access control to allow different users to make entries in different ledgers, each entry being verified by another user, balance sheet creation in MHRD format, and generation of all schedules, aggregation of reports (as of now only balance sheet, schedules is being worked upon) among multiple accounting units have already been done so far. Integration with BGAS of payroll, pico and fee management system has been achieved partially. The funds based accounting, closure of account and transfer to next financial year has also been done. Further user base has now grown to include ICHR Delhi, NBT Delhi, many Central Universities, NITIE Mumbai, University of Hyderabad, NIT Allahabad, NITTER Chandigarh etc.

SMVDU, AVV, NITH, IITR, AMU, JMI, DEI and IGNOU have withdrawn from the project. The modules of SMVDU which are related to financial accounting were pursued by the developers at IIT Kanpur. The code built so far will be kept in open source license under free public access. The project is not operational as there is no extension given by MHRD and also there are no funds in the project. But on his own, PI contribute to the codebase and documentation on his own.

URLs related to these project are given below.

<http://brihaspati.nmeict.in/brihaspati/servlet/brihaspati>

Other Products (beta) available at

<http://202.141.40.218/>

Questions/comments/feedback/discussion to brihaspati_ERP_mission@yahoo.com

Wiki of National ERP mission -

<http://202.141.40.215/WebApp/wiki>

Brihaspati LMS

<http://sourceforge.net/projects/brihaspati>

<http://brihaspati.sourceforge.net/>

Code repository at <http://brihsvn.iitk.ernet.in/repos>

Brihaspati Sync (MHRD/EE/20100108)

In BrihaspatiSync, live lecture delivery system has been built using P2P overlaid multicasting. The system is now functional. Now support for multiple reflector based content distribution network has also been added. Now reflector is also part of the client, and the client machines are triggered to become reflector to extend the overlay. This makes the solution scalable. In http tunnelling, to avoid the unnecessary delay happening due to round trip delays, the solution is now being worked upon. This is being done using an innovative algorithm which takes care of bandwidth variations and round trip delay both. The further enhancements in reliability, dynamic network reconfiguration, integration of open source video codec for screen share etc. are in process. Currently this project work is also stalled as there is no clear instruction either for its extension or closure.

It is a working system and can be used as precursor for Brihaspati-4 a p2p ERP system. In Brihaspati-4, the system will be re-engineered into single P2P system for content sharing, messaging, online examination, live lecture streaming. Currently the project is not going on due to lack of funds and extension from MHRD.

URLs for this project.

<http://brihaspati.sourceforge.net/>

Code repository at http://brihasvn.iitk.ernet.in/repos/Brihaspati_Sync_System

https://brihaspati.iitk.ernet.in:8443/brihaspatisync_client

Pedagogy (MHRD/EE/20090252)

In this project, curriculum structure of courses were to be designed. This project was pilot where curriculum structure of about 22 hours worth of content was to be built. The remaining was to be built in next phase. The curriculum structure is in form of learning objectives to be achieved for the learners. These are to be defined in

terms of actions verbs. Further how to test these learning objectives, was to be evolved in terms of questions and problems. Also the solutions of these questions and problems were to be provided. In addition what could be learning strategies, need to be stated.

There were two courses for which two faculty from IIT Kanpur volunteered. One of these from AE has been dropped as the persons responsible has informed that he does not have sufficient time to complete the work. For the other course, the required content has been built. The developed curriculum need to be reviewed. The name of reviewers have been suggested to National coordinator. The developer has finished the required course curriculum. Current status of the project with the coordinating institute is not known. The honorarium component is left as it is as the review has not been done so far and coordinating institute has not given go ahead of disbursement of honorarium.

As of now there is no extension and no directive on how to move forward with the project.

20130176 - Advanced computational research

This project is coordinated by Head, CC. The funds are used for supporting the HPC activities, subscription of software license. There are many other co-PIs from various departments. These co-PIs have been using HPC facility for research in their respective domains. There is no fund release for this project for quite sometime.

2015003 - IIT Council Website

The project is ON. The site is already operational. The enhancement work on the site is ongoing through our own developers now. MGRM Ltd which was given contract for building the site only does the maintenance of the site which they had delivered. The enhancement work is done on Drupal framework which is preferred framework and is now being integrated with the site delivered by MGRM Ltd.

Financial Status of ongoing MHRD Projects as on March 31, 2016

Sl No.	Project No.	Start Date	Sanctioned Amount	Expiry Date	Principal Investigator	Project Title	Amount Received	Total Expenditure	Project Status
1	MHRD /PIY /20090017	17-04-2009	2,56,00,000.00	31-03-2017	Raj Kumar THAREJA	BENCHMARKING OF INFORMATION AND COMMUNICATION TECHNOLOGY MODULES IN PHYSICS AND CHEMISTRY	2,02,00,000.00	1,53,27,418.00	Ongoing
2	MHRD /LS /20090141	28-08-2009	1,23,20,600.00	31-12-2015	PRADHUMNI GUPTA	NATIONAL PROGRAMME OF TECHNOLOGY ENHANCED LEARNING (PTEHL-II)	14,99,12,600.00	14,71,95,138.00	Ongoing
3	MHRD /AIE /20130082	03-06-2013	4,50,00,000.00	31-10-2015	C.S. PRADHYAY	KNOWLEDGE INCUBATION FOR TEQIP II	4,30,90,000.00	3,58,07,163.00	Ongoing
4	MHRD /CC /20130176	21-09-2013	5,60,00,000.00	30-09-2018	YATINDRA NATH SINGH	ADVANCED COMPUTATIONAL RESEARCH & EDUCATION	1,05,00,000.00	1,46,19,886.00	Ongoing
5	MHRD /MIET /2014258	07-11-2014	47,08,000.00	31-08-2017	KANISH BALANJ	VIRTUAL LAB PHASE-II	47,08,000.00	31,66,806.00	Ongoing
6	MHRD /CC /2015003	01-04-2015	10,00,000.00	31-03-2017	YATINDRA NATH SINGH	MHRD JIT COUNCIL WEBSITE	20,27,252.00	8,43,430.00	Ongoing
7	MHRD /AIDES/2015264	01-11-2015	2,00,00,000.00	01-11-2018	KOUMUDI PATIL	DESIGN INNOVATION CENTRE	2,00,00,000.00	-	Ongoing
8	MHRD /CS /2015251	10-11-2015	2,64,00,000.00	31-03-2017	T.V. PRABHAKAR	TEACHING AND LEARNING CENTRE	2,64,00,000.00	1,48,58,205.00	Ongoing
9	MHRD /DUSP/2015437	21-03-2016	3,58,05,000.00	30-03-2019	SATYAJI ROY	CENTRAL SECTOR SCHEME FOR MOOC-COMPLIANT E-CONTENT CREATION (NPTEL PHASE-IV)	-	-	Ongoing
10	MHRD /LIC/20100117	01-07-2010	1,93,60,000.00	31-12-2015	YATINDRA NATH SINGH	ERP-MISSION	8,52,20,638.00	8,52,26,260.00	Closed
11	MHRD /LIC/20100108	01-07-2010	10,20,000.00	31-12-2015	YATINDRA NATH SINGH	SYNCHRONOUS LIVE LECTURE DELIVERY SYSTEM-BIRUJASPATISYNC	30,60,000.00	32,89,652.00	Closed
	Total Amount		35,38,93,600.00				36,71,18,490.00	32,03,26,956.00	