

शोध Shodh

MNNIT RESEARCH BULLETIN

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Motilal Nehru National Institute of Technology Allahabad
Prayagraj-211004

मोतीलाल नेहरू राष्ट्रीय प्रौद्योगिकी संस्थान इलाहाबाद
प्रयागराज-211004

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Message from the Patron



Prof. Rajeev Tripathi, Director, MNNIT Allahabad

It is a matter of pleasure to see that the fourth issue of the Research Bulletin 'Shodh', is being published to share the achievements of faculty and research scholars.

I find it gratifying that the spirit of innovation and research continued unbridled in spite of various challenges, including lockdown, and other inhibitions on physical movement. The fruits of innovative research are reflected in transfer of technology to manufacturers and filing of patents, among others.

The Institute is committed to contribute its bit towards the vision of Aatmanirbhar Bharat by bringing forth new technologies and products in the service of humanity.

The academic environment at MNNIT is conducive to quality research and the faculty are self motivated to enlive the dream of Samarth Bharat through effective adoption and implementation of National Education Policy 2020. I am happy to share some of the highlights with the peers in academics and in industry.

May the spirit to innovate flourish.

Prof. Rajeev Tripathi
Director

VISION

To attain a distinct identity for the Institute through technology innovation, knowledge creation and dissemination for the benefit of the society.

Mission

- To nurture an eco system for continuous enhancement of value based teaching and learning process in the emerging areas of technology.
- To train quality human and knowledge resources in the service of society.
- To develop sustainable products and technologies.

मुख्य सम्पादक की लेखनी से



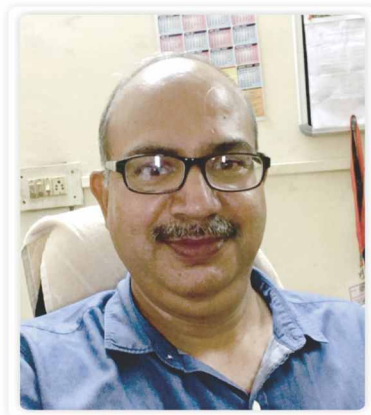
आपदा में अवसर तलाशने वाले समाज का विकास करते हैं। ज्ञान, विज्ञान, तकनीक तथा लगन के सम्मिश्रण से ही नवोन्मेष तथा नवीन समाधान जन्म लेते हैं। 'शोध' का चतुर्थ अंक संस्थान के निष्ठावान वैज्ञानिकों एवं तकनीज्ञों के प्रयासों एवं सफलताओं को प्रकाशित करने का विनम्र प्रयत्न है।

वैश्विक महामारी ने जीवन शैली एवं कार्य प्रणाली की नवीन परिभाषाएं दी हैं। मोतीलाल नेहरू राष्ट्रीय प्रौद्योगिकी संस्थान इलाहाबाद, प्रयागराज, के समस्त अध्यापक एवं छात्र-छात्राओं ने न केवल इस नवीन प्रणाली को आत्मसात किया वरन अनेकों नवाचार भी किये। परिणाम स्वरूप गत अर्द्धवर्ष में सात पेटेन्ट प्रतिवेदन किए गये तथा ऑनलाइन माध्यम से संस्थान की शोध काउंसिल द्वारा व्याख्यान आयोजित किए गये साथ ही राष्ट्रीय शिक्षा नीति 2020 के क्रियान्वयन हेतु उच्च स्तरीय गोष्ठी की गई।

ऐसी ही अनेक उपलब्धियों को प्रबुद्ध समाज तथा उद्योग जगत से साझा करने के लिए तथा भविष्य में और अधिक उपलब्धियों के लिए शुभकामना हेतु 'शोध' का वर्तमान अंक प्रस्तुत है।

गीतिका

अधिष्ठाता शोध एवं परामर्श



Foreword

It has been sometime since the Dean R&C office has come out with the idea of this research bulletin to showcase and highlight the research activities and achievements of the students and faculty. This new edition of SHODH grabs the opportunity to present all the exciting stuff happening in research & consultancy domain at MNNIT Allahabad. It is proud moment for me to present all the news and thereby attempting to enthuse more vigour and motivation among its readers. Last year we contributed our bit to fight against Covid-19 pandemic that shook the world. It was challenging time still we have made untiring efforts to strive for academic excellence in research and other academic activities.

I look forward to welcome and highlight the opportune news related to achievements in research endeavours in the next version.

A. K. Singh
Associate Dean (R&C)
Editor: Shodh

MNNIT Allahabad - A Glance

Celebrating Diamond Jubilee of its establishment, Motilal Nehru National Institute of Technology (MNNIT) Allahabad, is among one of the leading institutions in the country. Established in the year 1961 as a joint enterprise of Govt. of India and Govt. of Uttar Pradesh in accordance with the scheme of establishment of Regional Engineering Colleges, the Institute became a deemed University with effect from 26th June, 2002 and an Institute of National Importance in 2007. The Institute offers B. Tech. programmes in nine areas of technology, M. Tech. programmes in twenty for disciplines, alongwith MCA, MBA, MSc. and PhD. programmes in all branches of Engineering, Science and Management.

The infrastructure of the Institute is at par with the best institutions in the country, the Computer Centre has state-of-the-art computing facilities, departments have modern laboratories and the library houses print as well digital learning resources.

The entire campus, including hostels, executive development centre and residential area is connected with wired and wireless both. High speed internet service is available to all with 10 GBPs NKN Railtel and 500 MBPs BSNL fibre leased lines.

The Institute makes all efforts to strengthen collaborative research programmes in emerging areas of science and technology. Motilal Nehru National Institute of Technology Allahabad promotes advanced research via (i) joint thesis and research projects with industry participation, (ii) institutional assistantship to promote PG and Doctoral programmes, (iii) administrative support to faculty members to conduct consultancy and research projects, funded by external agencies.

Our alumni have headed top most public and private companies in India and abroad. They have also made a mark in Civil Services. The illustrious alumni have started connecting with their alma mater by giving back in various forms, such as sports and other student amenities.

MNNIT Allahabad is set to adopt the guidelines of National Education Policy 2020, for future batches of students.



Technology Transfer Hand Gloves Removing Device

Motilal Nehru National Institute of Technology Allahabad signed a Memorandum of Understanding (MoU) and exclusive technology transfer & license agreement with Caremont LLP Bangalore, for development and marketing of a hand glove removing device for prevention of infection(s) and hygiene of health care professionals and research personnel. MNNIT Allahabad has invented this technology which has immense application in Healthcare industry as well as the current pandemic COVID-19. This technology has been developed under the "Design and Innovation Centre" project of Ministry of Education.

The Caremont LLP, Bangalore is a startup and is a venture of the founders of Manjushree Technopack Ltd.

In the online event of signing MoU with Caremont, Prof. Rajeev Tripathi (Director), Prof. Geetika (Chairperson, IPR Standing Committee) Dr. Sarvesh K. Tiwari (Registrar) and all the inventors from department of Biotechnology, Dr. Ambak Kumar Rai, Prof. Shivesh Sharma, Dr. Sameer Srivastava, Dr. Ashutosh Mani, Dr. N.K. Singh were present from MNNIT side. Chairman Shri Vimal Kadre , Director Shri Ankit Kadre, Engineer Surendra Kedia, Mr. Rajat Kedia and Mr. Hasan Mohata attended the meeting from caremout side. Registrar Dr. Sarvesh K. Tiwari signed the MoU.

On this occasion, Prof. Rajeev Tripathi congratulated the inventors and said that on the occasion of Diamond Jubilee Celebration, the faculty of MNNIT has come up with solution against the potential threats in the current pandemic. He also mentioned that these technology transfer will set new way for the budding engineers. On this occasion, Prof. Geetika (Dean RGIA and Chairperson IPR Standing Committee) mentioned the importance of this technology transfer in the growth of institute as a whole. She congratulated the team of faculty members involved in this invention.



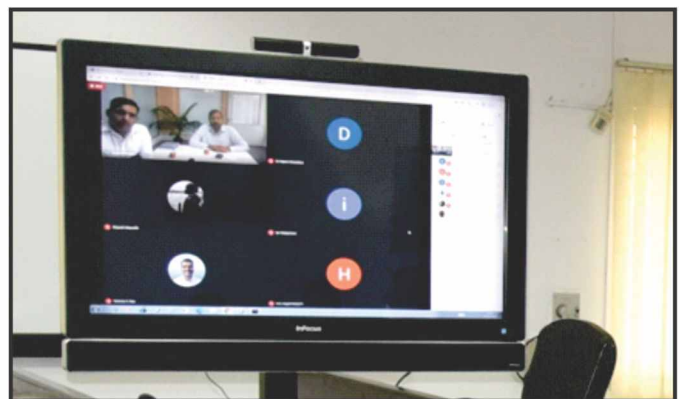
Technology Transfer Quick COVID19 Diagnostic System

A team of Mechanical Engineering Department, MNNIT Allahabad, comprising Prof. Mukul Shukla, Mr. Mayank Mayookh (MTech student), Dr. Samir Saraswati and Dr Praveen Kumar have developed a novel Covid19 diagnostics product.

MNNIT Allahabad entered into a non exclusive technology Transfer and License Agreement with Allengers Medical Systems Ltd. on 13.10.2020 through online mode. Director Prof. Rajeev Tripathi, Dean (R& C) Prof. Geetika, and Registrar Prof. Sarvesh Tiwari were present alongwith the team of inventors, whereas the chairman and team from Allengers were connected online.

This innovative solution integrates a portable, digital X-Ray machine and the AI based software and achieves a testing accuracy of 90-95% within 1 minute testing time. The likely beneficiaries of the portable, patient friendly diagnostic tool include administrative and healthcare authorities, medical diagnostic centres and hospitals and X-Ray and insurance companies.

This idea had also won the 1st prize on in the "Educators and Researchers" category competing against a total of 5200 teams in three categories in the 'Fight CORONA Online IDEathon' organized by MHRD Innovation Cell and AICTE.



Recently Awarded Externally Funded Projects

Research Project Topic :	Design & Development of a Proof-of-Concept Model of a Doubly Curved Membrane-based Space Structure
Funding agency :	(TEQIP-III) TEQIP Collaborative Research Scheme
Name of Faculty member :	Dr. Satish Kumar
Name of the Department :	Applied Mechanic Department

Abstract of research with results :

The main objective of this study is to understand dynamic behavior of membrane structures and its control at on-orbit conditions. The three main analyses (wrinkling, vibration and shape control) have been carried out on the membrane structures. The different geometrical and boundary conditions have been considered to study the various shapes (rectangular, square, triangular, hexagonal, parabolic, circular) of the structures. Different approaches like optimal edge trimming, anchor points, multilayer design, optimal loading and optimal design of anchoring have been discussed to control the wrinkle formations.

Research Project Topic :	Augmentation of fermentative biohydrogen production by using nanoparticles and immobilization techniques for mitigating biowastes
Funding agency :	DST
Sanctioned Amount :	Rs. 28,89,400.00
Name of Principal Investigator :	Priya Rai
Name of Faculty Mentor :	Prof. Anjana Pandey
Name of the Department :	Biotechnology

Abstract of research with results :

Augmentation in bio-hydrogen production includes the use of cell adsorption technique for escalation in productivity of bioenergy. Different low cost matrices such as Polyurethan foam, Polyethylene foam, and Scotch brite foam were used for the immobilization of *B. licheniformis* AP1 and for the intensification of bio-hydrogen production in this study. The study displayed that the foam was the best carrier for the immobilization of *B. licheniformis* AP1 and bio-hydrogen production increase. Effect of support carrier on repeated batch run was also studied and revealed that foam was the best support carrier that can be used from 6 to 7 times for repeated batch test in *bio-hydrogen production*.

Research Project Topic:	Universality of spectral fluctuations in dissipative quantum chaotic systems with symplectic invariance
Funding agency:	TEQIP-III
Name of Faculty member:	Dr. Ravi Prakash
Name of the Department:	Physics

Abstract of research with results:

The dissipative chaotic quantum systems can be classified in three category according to the invariance of their non-dissipative counterpart under time reversal and rotation. The dissipative systems without any invariance are known to follow statistics of the Ginibre ensemble of random matrices. In an earlier study, we found that the effect of dissipation on systems with TRI follows the statistics of symm-Ginibre ensemble. In this project, we show that the another class of chaotic systems, viz, the systems invariant under time reversal but not invariant under rotation and have half-integer spins show the statistics of self-dual Ginibre ensemble of random matrices with complex quaternions elements when dissipation is present. We have also verified our results for a standard prototype model of chaos i.e., kicked top and found it in excellent agreement with the above mentioned class of Ginibre ensembles.

Research Project Topic : Syntheses, Characterisations and Applications of Luminescent Metal Organic Frameworks
Funding agency : Department of Science and Technology, India
Sanctioned Amount : Rs. 27,95,000.00
Name of Principal Investigator : Dr. Arti Chouhan
Name of Faculty Mentor : Dr. Ashutosh Pandey
Name of the Department : Chemistry

Abstract of research with results :

In this project, metal organic frameworks have been synthesised through hydrothermal or solvothermal methods. Luminescent MOFs are synthesised by combining organic ligands with metal ions. Synthesized metal organic frameworks are investigated which will find applications in developing ratio metric luminescent sensors, catalysis and white-light-emitting materials.



Research Project Topic : Regionalization of Hydrological model parameters for Indian rivers
Funding agency : AICTE
Name of Faculty member : Dr. Pramod Soni (Co-PI)
Name of the Department : Civil Engineering

Abstract of research with results :

The present study evaluated five regionalization methods: global averaging; regression; spatial proximity; behavioral similarity and artificial neural network (ANN) for Soil and Water Assessment Tool (SWAT), using data from 24 river basins in monsoon dominated tropical river basins of peninsular India. Regionalization was performed for each basin using the remaining 23 basins. Overall, we found that the regression method outperforms other regionalization methods in terms of predicting the daily as well as peak discharges. It was found that despite showing a better R2 in training, testing and validation, the ANN method performed poorly probably due to lesser number of training data. Therefore, it is suggested that the ANN should be avoided for regionalization in the absence of sufficient training data.



Research Project Topic : Mapping ground water quality Depleted area. Potential Groundwater Recharge Zones and Exolxing the Farmer's need based Groundwater Recharge structures in District Mahoba of Bundelkhand region of UP
Funding agency : DST
Name of Faculty member : Dr. Pramod Soni (Co-PI)
Name of the Department : Civil Engineering

Abstract of research with results:

- a. To map the lineaments and topographic details including geomorphological features on 1:25000 scale.
- b. To find the thickness of overburden and potential fractures.
- c. To monitor the groundwater level during pre and post monsoon period alongwith their quality.
- d. To integrate findings and preparation of groundwater quality map and feasible groundwater recharge area/zones and identification of feasible and farmer's need based groundwater recharge structures.



Research Project Topic: Development of an integrated intelligent surveillance system for suspicious behaviour analysis
Funding agency: DST SERB under CRG scheme [Collaborative project]
Name of Faculty member: Dr. Dushyant Kumar Singh (PI at MNNIT)
Name of the Department: Computer Science and Engineering

Abstract of research with results:

Recently worldwide terrorist activities have demonstrated that there is a strong need for improvement in existing video surveillance. The aim is to develop an integrated intelligent surveillance system, which can monitor the site by automatically detecting and classifying suspicious objects and track them across field of view of various cameras. System designed will be able to understand and describe human activities/behaviour to replace the traditional surveillance mechanisms. The proposed project will investigate, implement and integrate different techniques which can be useful for identification of human behaviour.

Research Project Topic: Information System Education and Awareness (ISEA)-II
Funding agency: Ministry of Communication and Information Technology, Department of Electronics and Information Technology HRD Division
Sanctioned Amount: Rs. 48,18,000.00
Name of Faculty member: Prof. Rama Shankar Yadav (PI) & Prof. Anil Kumar Singh (Co-PI)
Name of the Department: Computer Science and Engineering

Abstract of research with results:

The Government under Ministry of Electronics & Information Technology (MeitY) also launched an Information Security Education and Awareness (ISEA) Project for generating qualified and right kind of human resources to meet the emerging Cyber Security needs through education and training programmes through institutions such as IISc, select IITs, NITs, IIITs, C-DAC, NIELIT and attached offices of MeitY. The key focus of the project for training the manpower for the scope of security issues in information security that is ultimate need in Digital India scheme, BharatNet.

Outcome of the project:

The Academic Deliverables / Achievements [FY 2015-2021] includes the training the manpower for the scope of security issues in information security that is ultimate need in Digital India scheme, BharatNet and others. Total 2530 manpower is trained in the theme area of the project.

Research Project Topic: E-Mobility: An Electricity Grid Perspective
Funding agency: Scheme for Promotion of Academic and Research Collaboration (SPARC)
Sanctioned Amount: Rs. 63,68,355.00
Name of Faculty member: Prof. Asheesh Kumar Singh
Name of the Department: Electrical Engineering

Abstract of research with results:

The proposed work aims to address the critical innovations in e-mobility and integration of renewable energy sources (RESs) in electric vehicle (EV) charging infrastructure through a project-based teaching approach. The consortium involves academic partners from Denmark and India with expertise in technical research and academic capabilities. The focus is towards adaption of the global solutions in the Indian contexts, i.e., in the perspectives of cost, consumer requirements in various segments, climate, driving patterns, and supply-chain, regarding adaptability, availability, and indigenous capability.

Online Seminar on Roles and Responsibilities of Higher Technical Institutions in Effective Implementation of National Education Policy 2020

One day National Online Seminar on "Roles and Responsibilities of Higher Technical Institutions in Effective Implementation of National Education Policy 2020" was organised on October 16, 2020. The Seminar commenced with lighting of lamp by Director of the institution Prof. Rajeev Tripathi, Prof. Geetika, President IIC and Dean (Research and Consultancy), Registrar Dr. Sarvesh Tiwari and members of organizing committee, Vice President of IIC Prof. A.K. Singh Convener IIC Prof. Shivesh Sharma, and Deans Prof. Rakesh Narain, Prof. M.M. Gore, Prof. R. K. Singh, Prof. K.N. Pandey.

The Chief Guest for this online national seminar was the Chairman, Committee for Draft National Education Policy Padma Vibhushan Dr. K. Kasturirangan. Prof. Geetika, welcomed the participants and guests and detailed the program schedule. Prof. Rajeev Tripathi explained that the main objective of this one day online seminar was to bring faculties, researchers, engineers, students, research scholars, industrialists and government representative on a common platform. Prof. Rajeev Tripathi highlighted the far-sightedness of Honourable Prime Minister Shri Narendra Modi Ji and Education Minister Dr. Ramesh Pokhriyal by adding that the policies such as 'Atmanirbhar Bharat' will strengthen the development of the nation. Shri Madan Mohan ADG(HE) Ministry of Education discussed the significant roles of technical institutions in fulfilling its objectives. Padma Vibhushan Dr. K. Kasturirangan in his intellectual address stated that the New Education Policy aims at providing employment skills without compromising the quality of education. Dr. Kasturirangan said that the youth of the country will be prepared to gain wide knowledge which will help and motivate them to qualify for their desired occupation. He also added that this new education policy was the need to meet the challenges of 21st Century.

Directors from various NITs, IITs and IIITs of the country participated in the online webinar. The seminar was organised in three panels in which experts including Director NIT Tirichirupalli, Dr. Mini Shaji Thomas; Director IIT Roorkee, Prof. Ajit K. Chaturvedi; Director NIT Warangal, Prof. N. V. Ramana Rao; Director IIIT Allahabad, Prof. P. Nagabhushan; Director NIT Jamshedpur, Prof. K.K. Shukla; Director NIT Jaipur, Prof. Udaykumar R.Y., discussed various perspectives of National Education Policy 2020 in details.

Member of NITI Aayog Padma Bhushan Dr. V. K. Saraswat speaking as Chief Guest of valedictory session, emphasized on the role of higher educational institutions specially National Institute of Technology. He explained the importance of multi disciplinary education in dynamic progress of the technical and scientific achievements of the country.



Diamond Jubilee Lecture on "Role of Science & Technology and Innovation in Modern Society"

Dr. Shekhar C. Mande, Secretary, Department of Scientific and Industrial Research & Director General, Council of Scientific & Industrial Research (CSIR) spoke on the topic "Role of Science & Technology and Innovation in Modern Society". The lecture was widely attended. First Diamond Jubilee lecture was organized by Institute Innovation Council (IIC) on September 02, 2020, through online mode.

Dr. Mande said that in today's world, innovation can no longer be exported. This means strategic partnerships with private sector, innovative financing, and a broad recognition of the ability of actors in developing country partners to innovate. Facilitating these efforts will be a boon for the all of us.

However, for Science & Technology to translate to improved quality of life, wealth and employment creation, it must be focused at bringing new goods and services in the market place. In other words, Science & Technology efforts must be geared towards innovation: the process of bringing new products to the market. There is therefore the need to put in place explicit strategies, mechanisms and institutions to translate scientific knowledge to development. This necessitates the formulation and regularly reviews of Science & Technology policies in driving sustainable development.



A symposium on “National Education Policy: Innovation, Entrepreneurship and Technology Transfer”

December 11, 2020

A symposium on “National Education Policy: Innovation, Entrepreneurship and Technology Transfer” was organized at Motilal Nehru National Institute of Technology Allahabad, Prayagraj on December 11, 2020, through hybrid mode including physical and online.

Prof. Rajeev Tripathi, Director, MNNIT Allahabad, delivered welcome address during the function. He highlighted the achievements of the Institute and appreciated the work carried by the faculties and technocrats who attempted to turn a disaster like the Corona epidemic into an opportunity.

Prof. Geetika, President IIC, Dean Research and Consultancy and Resource Generation and International Affairs, presented actionable points for National Institute of Technology w.r.t effective implementing of National Education Policy 2020.



The Chief Guest of the program, Hon'ble Minister Shri Sanjay S. Dhotre, Hon'ble Minister of State in the Ministries of Education, Communications and Electronics & Information Technology, Government of India, applauded the efforts in organizing the symposium and other innovative and entrepreneurial activities organized by the Institute. He also admired the innovations made by the students and the technocrats appreciating that the successful engineer in the changing environment is the one who knows all genres. He highlighted the new education policy encourages innovation and entrepreneurial skills and attempts to develop new skills without compromising on quality. Our Hon'ble Prime Minister, Shri Narendra Modi vision in effective implementation of the new education policy with emphasis on Aatma Nirbhar Bharat was also appreciated. The vote of thanks was delivered by Dr. Sarvesh Kumar Tiwari, Registrar, MNNIT Allahabad. All Deans and Heads of the Departments were present during the occasion and entire program was also webcast live.

The event saw a participation of more than 200 participants including students, faculty member from MNNIT Allahabad and other Institutes.

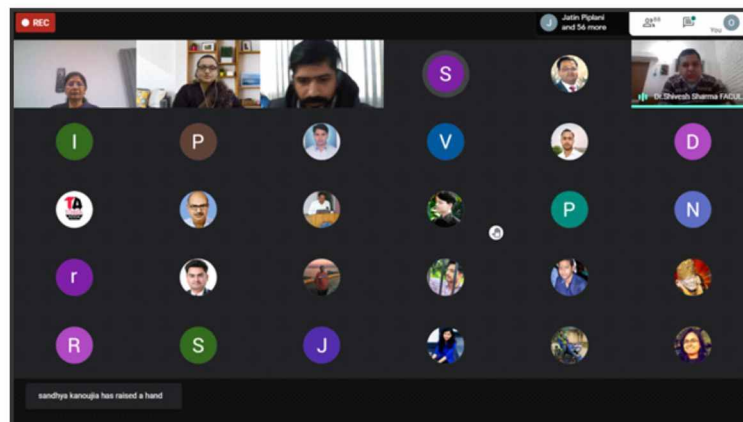
Workshop on Design Thinking, Critical Thinking and Innovation Design

The workshop was held online on 26-12-2020 as an initiative of IIC. The event began with address by Convener and President IIC and with the formal introduction of the session's speaker Ms. Disha Kaushal, Design & Strategy Consultant. The event saw a huge number of participation from students side. Design Thinking helps us in the process of questioning: questioning the problem, questioning the assumptions and questioning the implications. Design Thinking also involves ongoing experimentation: prototyping, testing, and trying out concepts and ideas. The focus of innovation has some what shifted from being engineering-driven to design-driven, from product-centric to customer-centric and marketing-focused to user-experience-focused. The proper implementation of design thinking in day to day life is taught in the workshop. Prof. Rajeev Tripathi, Director, MNNIT Allahabad, shared his views on the topic.

Session on Identifying Intellectual Property Component at early stage of Innovation

The session expert Mr. Lalit Ambastha, founder and Patent Attorney, M/s Patentwire Consultants, talked about IPR works. The event saw an enormous turnout from the first year students of all branches. The steps involved in building a startup and innovation are to match it with the current scenario and test its sustainability by thinking in direction of professionalism and intellectuality. Testing and putting ideas into different cases results in identification of many problems lying ahead. You should adapt any change as early as possible if it enhances our idea. In intellectual component makes any innovation market ready and ar larger scale. This creates a basic idea that how we should implement any idea or innovation and test it and make changes in it which will make it reliable and professionally stable.

Faculty Coordinators, President IIC and Director MNNIT Allahabad also shared their views.



Awards & Honors

- Prof. M. M. Gore with Mr. Deepak Kumar and Mr. Abdul Aleem, Department of Computer Science and Engineering, received **best paper award** for paper, *“Employing Data Augmentation for Recognition of Hand Gestures using Deep Learning”*, in Congress on Intelligent (CIS-2020) September 5-6, 2020 at New Delhi, India.
- Ms. Arti Chouhan and Dr. Ashutosh Pandey, Department of Chemistry, received **best paper award** for publishing paper, *“Indian Chemical Society Research Excellence Award”* Recent Trends in Chemical Sciences International Conference on (RTCS-2020), Dec. 26-29, 2020 at Online Conference organized by Indian Chemical Society Kolkata, India.
- Mr. Sushil Kumar Singh, Mr. Amit Kumar, Mr. Samarjit Singh, Dr. Abhishek Kumar and Prof. Anuj Jain, Department of Applied Mechanics, received **best paper award** for paper, *“Investigation of thermo-mechanical properties of surface treated SiO₂/epoxy nanocomposite (<https://doi.org/10.1016/j.matpr.2020.09.137>)”* in the International Conference & Exposition on Mechanical, Material and Manufacturing Technology (ICE3MT2020) 9-10 October, 2020 at CVR College of Engineering Hyderabad.
- Dr. Tripti Singh and Ms. Chetna Sachdeva, School of Management Studies, received **best paper award** for the track *Human Resource Management*, in '3rd Jaipuria International Conference on Envisioning Business 2020' at Jaipuria Institute of Management Indore, 17th & 18th July, 2020 at Virtual mode.
- Dr. Dipayan Guha, Mr. Provas Kumar Roy and Ms. Subrata Banerjee, Department of Electrical Engineering, received **best paper award** for paper, *“Grasshopper optimization algorithm scaled fractional order PI-D controller applied to reduced order model of load frequency control system”* in International Journal of Modeling and Simulation, Taylor and Francis* in July, 2020
- Mr. Raghvendra Tiwari, Mr. Ravindra Kumar Singh and Dr. Niraj Kumar Choudhary, Department of Electrical Engineering, received **best paper award** for paper, *“Power System Protection”* in 6th Students Conference on Engineering & Systems (SCES-2020) July, 2020 at MNNIT Allahabad.
- Prof. Shiv Datt Kumar, Department of Mathematics, awarded with **“International Outstanding Scientist Award on Engineering, Science and Medicine category”** in the event *“International Scientist Award on Engineering Science and Medicine”* on October 17, 2020 at VDGGOOD Professional Association India, Kolkata.

Publications

- Mukesh Kumar and Kumari Manju, published paper titled "*Closed form invariant solutions of (2+1)-dimensional extended shallow water wave equation via Lie approach*" in journal "The European Physical Journal Plus" Vol. 135 (Article: 803) issue 12, pp 1-14, 2020, Impact factor 3.228
- Pramod Kumar Yadav and Amit Kumar Verma, published paper titled "*Analysis of immiscible Newtonian and non-Newtonian micropolar fluid flow through porous cylindrical pipe enclosing a cavity*" in journal "The European Physical Journal Plus" Vol. 135 (Article: 645), issue 8, pp 1-35, 2020, Impact factor 3.228
- Supriya Yadav, Devendra Kumar and Kottakkaran Sooppy Nisar, published paper titled "A reliable numerical method for solving fractional reaction-diffusion equation" in journal "Journal of King Saud University-Science" Vol. 33, issue 2, pp 101320, 2021, Impact factor 3.819
- Dipesh Shikchand Patle, Ashutosh Pandey, Sameer Srivastava, Ashish N. Sawarkar and Sushil Kumar, published paper titled "Ultrasound-intensified biodiesel production from algal biomass : a review" in journal "Environmental Chemistry Letters" Vol. 156, pp. 1-21, 2020, Impact factor 5.99
- Savyasachi Shrikhande, G. Uday Bhaskar Babu, Z Ahmad and Dipesh S. Patle, published paper titled "*Intensification and analysis of ethyl levulinate production process having a reactive distillation through vapor recompression and bottom flash*" in journal "Chemical Engineering and Processing-Process Intensification", Vol. 156, pp. 108081, 2020, Impact factor 3.7
- Dipesh S Patle, Savyasachi Shrikhande and Gade Pandu Rangaiah, published paper titled "*Process Development, Design and Analysis of Microalgal Biodiesel Production Aided by Microwave and Ultrasonication*" in journal "Process systems engineering for biofuels development by John Wiley & Sons, Ltd", pp 259-284, 2020
- Dipesh S Patle, Vijay Khajone, Pundlik R Bhagat, Arvind K Jaiswal and Sushil Kumar, published paper titled "*Functionalized Ionic Liquids for the Photodegradation of Dyes*" in journal "Water Pollution and Remediation: Photocatalysis by Springer" pp 391-409, 2020
- Anjana Pandey, Pallavi Sinha, and Ashutosh Pandey, published paper titled "*Hydrogen production by sequential dark and photofermentation using wet biomass hydrolysate of Spirulina platensis: Response surface methodological approach*" in journal "International Journal of Hydrogen Energy Publisher-Elsevier" Vol. 46, issue 10, pp 7137-7146, 2021, Impact factor 4.2
- Saumya Srivastava and Anjana Pandey, published paper titled "*Computational screening of anticancer drugs targeting miRNA155 synthesis in breast cancer*" in journal "Indian Journal of Biochemistry & Biophysics Publisher-National Institute of Science Communication and Information Resources (NISCAIR)" Vol. 57, issue 4, pp 389-394, 2020, Impact factor 0.537
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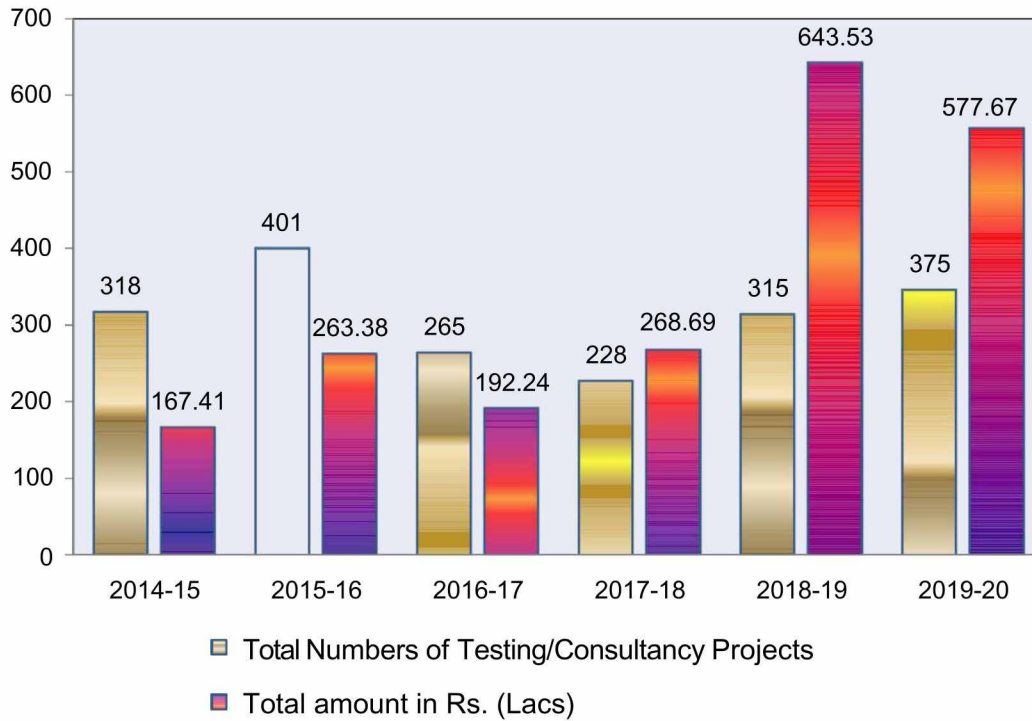
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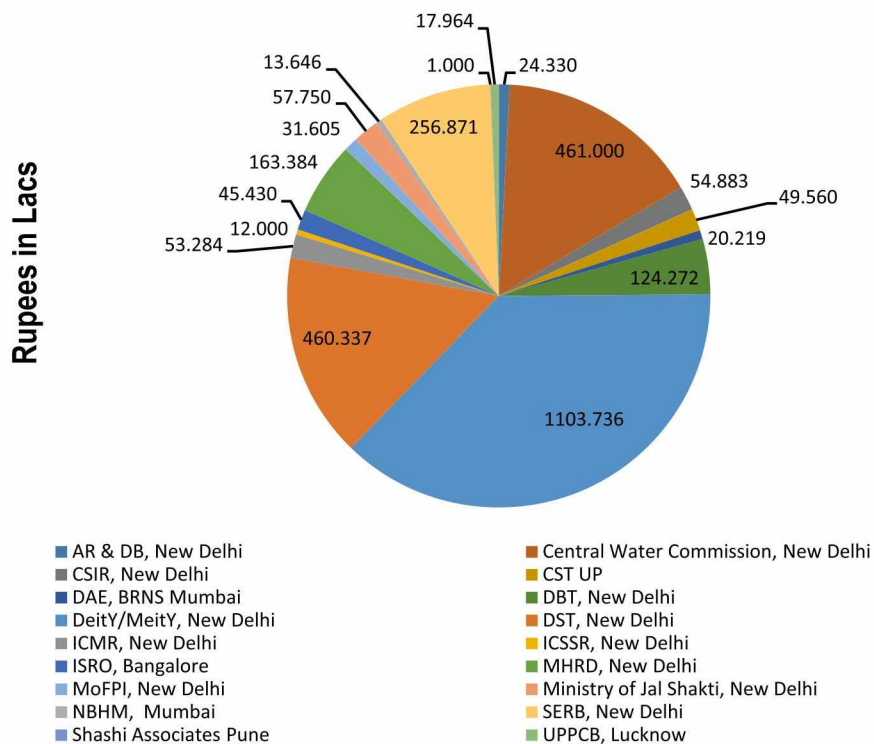
Patent Applications

S.No.	Title	Name of Inventors	Application No.	Date of filling
1.	A Pre-doffing Personal Protective Equipment Sanitization System	Mr. Pranav Tripathi Dr. Seema Nara	202011030723	18-07-2020
2.	An Automatic Sanitizer Machine - Design	Mr. Pranav Tripathi Dr. Seema Nara	202011030722	18-07-2020
3.	A portable diagnostic system for a medical condition using X-ray imaging of Lungs	Prof. Mukul Shukla Mr. Mayank Mayookh Dr. Samir Saraswati Dr. P.K. Agarwal	202011031404 (Published on 25-09-2020)	22-07-2020
4.	A Novel Method for preparing Octenyl Succinic Anhydride (OSA) modified Starch	Ms. Aditya Ganesh Mr. Arijit Dutta Gupta Dr. Harinder Singh Ms. Mandavi Goswami	202011038429	05-09-2020
5.	An Energy Harvesting, Storage and Delivery System	Prof. Ramesh K. Tripathi Mr. Jeetendra Prasad	202011042654	30-09-2020
6.	A modular hybrid converter for generating multiple direct current outputs and single multilevel alternating current output	Dr. Rajesh Gupta Mr. Pandla Chinna Dastagiri Goud	202011048237	04-11-2020
7.	A Multi-Modular Microbial Fuel Cell	Ms. Roma Agrahari Dr. Radha Rani	202011055658	21-12-2020

Testing and Consultancy Funding Statistics



Ongoing Research Projects, According to Funding Agency

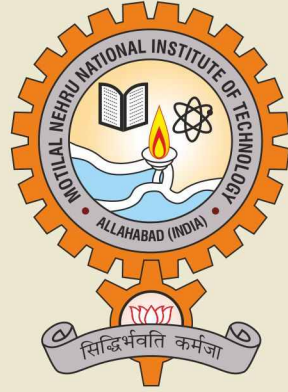




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Major Research Fields in the Departments

Name of the Department	Research fields
Applied Mechanics	Computational Solid Mechanics, Composite Structures, Finite Element Analysis, Advanced Structural Systems, Kinematic and Dynamic analysis of musculoskeletal system, Damage mechanics, Sound, noise and vibration, Thermo-Fluids Engineering, Solid mechanics, Characterization of smart materials, Bone Adaptation.
Biotechnology	Agricultural Biotechnology, Bioinformatics, Bioprocess Development, Bio-energy, Environmental Biotechnology, Genetics & Genetic Engineering, Immunology, Medical Biotechnology, Microbiology, Nanoparticle based diagnostic.
Chemical Engineering	Membrane and Reactive Separation, Convective heat transfer, Chemical reaction engineering, Process Modeling and Simulation, CFD, Environmental science & engineering, Industrial hazard, Process Safety & Hazards Management, Advanced Distillation Technology, Food Technology and Bio-processing
Chemistry	Inorganic nano-chemistry, Sensor analyte, Metal organic frameworks, Nano-biotechnology, Polymers
Civil Engineering	Structural Engineering, Geotechnical Engineering, Environmental Engineering, Transportation Engineering, GIS and Remote Sensing, Environmental Geo-technology, Water Resources Engineering, Construction Engineering and Management.
Computer Science & Engineering	Software Engineering, Mobile Computing, Knowledge Based System, Real Time System, Distributed Computing, Soft Computing and Machine Learning, Image Processing, Biometrics, Pattern Recognition, Data mining, Network Security
Electrical Engineering	Power electronics, Electrical drives, Power system operation, control and protection, Smart grid challenges, Renewable energy systems, Non-linear control theories and its applications
Electronics and Communication Engineering	Data Communication and Networking, Optical Communication, Digital Signal Processing, Image Processing, Pattern Recognition, Biometrics, Mobile and ATM Network, Wireless Sensor Network, Analog and Digital Circuits, VLSI Design, Characterization of semiconductor devices
GIS Cell	GIS applications; GNSS and InSAR technology (core and application), Natural Hazard monitoring, Machine Learning applications in Geoinformatics, WebGIS, LiDAR technology, Satellite Image Processing
Humanities and Social Sciences	English Psychology Human Resource Management, Accounting & Finance.
Mathematics	Commutative algebra, Basic hypergeometric functions, Numerical analysis, Operation research, Soft computing, Cryptography, Fluid dynamics, Heat & Mass transfer, Bio-fluid mechanics, General topology, Nearness-like structures & Near set theory.
Mechanical Engineering	CAD/CAM, Manufacturing processes, Chain management, Composite materialsits characterization, Fracture and fatigue, Multi-scale machining processes, Mechanical system design, Nanocomposites characterization, Refrigeration, Cryogenics, Heat transfer, CFD, Air-conditioning, Passive Cooling.
Physics	Experimental condensed matter physics, Theoretical physics, Nano structured thin films, Functional oxide nano-materials, Synthesis and optical, magnetic and electric properties, of 2D systems
School of Management Studies	International finance, Marketing Management, Financial management, Human Resource management, Management information systems, Entrepreneurship, Strategic Management



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