



शोध Shodh

MNNIT RESEARCH BULLETIN

Vol. 5, Issue 2, 2022



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. Rama Shanker Verma, Director, MNNIT Allahabad

I am glad to see the Volume-5, Issue-2 of the Shodh research bulletin being published by the R&C Cell of the Institute. MNNIT Allahabad has a dedicated team of academicians who are actively indulged in both academics as well as quality research which has strengthened the academic profile of the Institute.

Our focus is to achieve merit of qualifications in teaching as well as research areas, developing new technologies and devices for the benefit of society at large. I am glad that R&C Cell is making efforts to promote research and development and sharing the recently developed technologies by the Institute. Looking forward, the Institute will continue to conduct quality research and develop new technologies.

Prof. Rama Shanker Verma

Director

मुख्य सम्पादक की लेखनी से.....



शोध एवं परामर्श कार्यालय, एम0एन0एन0आई0टी0 इलाहाबाद शोध परियोजना और परामर्श को सफलतापूर्वक पूरा करने के लिए संकाय सदस्यों को प्रशासनिक सुविधा प्रदान करने के लिए प्रतिबद्ध है। पिछले तीन सालों से सफलतापूर्वक 'शोध' पत्रिका एम0एन0एन0आई0टी0 इलाहाबाद रिसर्च बुलेटिन के प्रकाशन करने के बाद आपके हाथों में Vol. 5, Issue 2, 2022 को प्रदान करते हुए हमें बड़ी प्रसन्नता हो रही है। इसके लिए शोध से जुड़े संकाय सदस्यों एवं कर्मचारियों के अनुकरणीय योगदान के लिए हम उन्हें हृदय से धन्यवाद देते हैं।

समाचार पत्र "शोध" एम0एन0एन0आई0टी0 इलाहाबाद, समस्त संकाय सदस्यों एवं छात्रों द्वारा किये गये शोध और परामर्श से जुड़े उपस्थितियों को प्रदर्शित करने का प्रयास करता है। ये गतिविधियाँ हमारे शोध एवं परामर्श समुदाय की जीवंतता को दर्शाती हैं। प्रशासनिक समर्थन एवं कड़ी मेहनत द्वारा हम शोध एवं परामर्श से सम्बन्धित कार्यों को सुचारु रूप से बढ़ावा देने के लिए हर तरह से प्रतिबद्ध हैं। शोध और नवोन्मेष के और भी कई क्षेत्र हैं जिसके लिए हम आपके साथ काम करने और उससे जुड़े नवीन विचारों को शामिल करने के लिए कटिबद्ध हैं।

'शोध' पत्रिका को जारी करने का उद्देश्य हमारे शैक्षणिक शोध, परियोजनाओं, परामर्श और परीक्षणों को बढ़ावा देना है तथा समस्त हितधारकों को तत्सम्बन्धी सूचना देना है।

'शोध' का विमोचन और वितरण हमारे शोध एवं नवोन्मेष के लिए हितधारक और लोगों के बीच संचार की एक महत्वपूर्ण कड़ी हो सकती है।

रमा शंकर यादव
अधिष्ठाता शोध एवं परामर्श



Foreword

It gives me immense pleasure to bring this new edition of SHODH. The concept of publishing Shodh, fosters the basic idea of showcasing the scientific acumen and untiring efforts of people at MNNIT Allahabad, in order to bring excellence in every domain. This bi-annual magazine catalogues the ongoing research activities, research and consultancy projects, and various accolades and achievements of the stakeholders. I hope that not only the success stories and awards and recognitions of the achiever's listed in this issue, but the efforts of all who have made even slightest contribution shall be a motivation and incitement for unquenched curiosity to know more and grow more. I believe that whenever we need to make decisions, we need to do research. Wisdom is knowledge rightly applied. Conducting research is about gaining wisdom.

MNNIT has signed many MoUs to facilitate the collaboration of the brightest minds from industry and academia, for bringing out the sustainable and affordable solutions to the larger challenges that society and humankind is facing.

I hopefully look forward to welcome and highlight the opportune news related to your achievements in research endeavours in the future versions of Shodh, that will makes this institution proud and our society a little more delightful for living.

Anil Kumar Singh
Associate Dean (R&C)
Editor: Shodh

Signing of MoU between MNNIT Allahabad and MUNPL Meja

MNNIT Allahabad and Meja Urja Nigam Private Limited (MUNPL), signed a Memorandum of Understanding (MoU) on date October 01, 2021 for collaborative work in different areas. Mr. R. K. Kanojia, Chief General Manager from MUNPL and Dr. Sarvesh Tiwari Registrar from MNNIT Allahabad signed the agreement in presence of Mr. Rakesh Kumar, Chief Executive Officer from MUNPL and Prof. Rajeev Tripathi, Director MNNIT Allahabad.

The present MOU between MUNPL and MNNIT shall broadly cover (but not limited to) mutual collaboration in the following areas:

1. Technical support and expertise of MNNIT experts may be taken on environmental, water, plant technical issues as well as for switch-yard civil structural study, stability studies, etc.
2. The parties shall also collaborate for up-gradation of IT systems in MUNPL, including introduction of new technologies like Data Analytics, Artificial Intelligence (AI), Machine Learning and Robotics with emphasis on improvement in Power Plant Technologies and facilitating better decision-making.
3. MUNPL and MNNIT shall also collaborate for facilitating joint thesis/research projects and special projects on power plant problems, energy and allied technologies including renewable to be done by B.Tech/M.Tech. students and research scholars. The successful projects shall be considered for suitable reward by MUNPL.
4. MUNPL shall provide experts with industry experience as faculties for taking lectures explaining power plant practical aspects and best industry practices for the benefit of MNNIT students.
5. The parties shall explore opportunities for development of courses and curriculums customized to industry requirements, especially in the field of Power Plant Technologies.
6. Plant visit, vocational training programmes and other activities of non-commercial nature which will facilitate to study of MNNIT students/researchers shall be arranged at MUNPL.
7. The parties shall pursue collaboration for development of new products and technologies, joint publications and patents/intellectual property rights in power plant technologies and allied areas.
8. MUNPL may provide sponsorship for technical fests, exhibitions/cultural programs, sports events, institute journals and souvenirs, etc. at MNNIT & may organize quizzes, debates or other such programs for the academic and co-curricular development of the students of mnnit, with mutual consent.
9. Every year, celebration of Engineers Day, National Technology Day, World Environment Day, etc. may be taken up the parties jointly or severally, with mutual consent.
10. Rewards/felicitation by MUNPL may be sponsored on merit cum means basis by MUNPL for excellent academic and research performers of MNNIT, with mutual consent.
11. Quality testing may be carried out by MNNIT at or on behalf of MUNPL as per requirement.
12. The parties shall also pursue collaborative ventures in grassroots technologies targeted at the development of people and areas in the vicinity of MUNPL units through the Community Development (CD) AND Corporate Social Responsibility (CSR) programs of MUNPL.
13. Any other programme or partnership may be taken up jointly by mutual consensus of CEO (MUNPL) & Director (MNNIT).



Signing of MoU between MNNIT Allahabad and ITI Ltd. Bengaluru

Motilal Nehru National Institute of Technology (MNNIT) Allahabad signed Memorandum of Understanding (MoU) on date November 12, 2021 with ITI Ltd. Bengaluru. The ceremony to exchange the MoU was held in online mode by the Director MNNIT Allahabad, Prof. Rajeev Tripathi and General Manager-HR Shri Murli Dhar Dwivedy, ITI Ltd Bangalore.

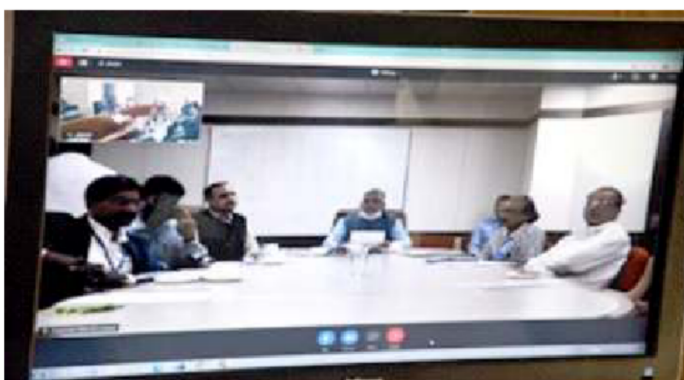
The objectives include joint collaborative research projects in cutting edge technology, organizing international workshops, conferences, training programmes, FDPs and certification based courses etc.

There will also be exchange of faculty members and students/ research scholars as also the students of MNNIT Allahabad will go for internship at ITI Ltd.

Both, MNNIT Allahabad and ITI will share their expertise and resources in order to carry out research and development in the emerging areas of technologies like 5G, IoT, AI, Robotics and optical communication systems. Also, a centre of excellence will be established for collaborative work and to train the trainers of ITI Ltd. internal resource persons.

Objectives of the MoU

1. Joint collaborative research projects in cutting technology.
2. Joint organization of technical meetings, international workshops, conferences, seminars, certification based courses, faculty development programs, symposia etc. For internal employees and external Candidates.
3. Exchange of faculty members and student's/Research scholars for mutually agreed duration and terms and conditions.
4. Organize joint training programme(s) for third party based on the technology developed through this collaboration.
5. To encourage students of MNNIT Allahabad to come for internship at ITI Ltd.
6. Helping in consultancy projects in areas of mutual interest.



Signing of MoU between MNNIT Allahabad and PPGCL

Motilal Nehru National Institute of Technology (MNNIT) Allahabad signed Memorandum of Understanding (MoU) on date December 03, 2021 with Prayagraj Power Generation Company Limited (PPGCL) Tehsil -Bara, Dist-Prayagraj for collaborative work in different areas. C.E.O., PPGCL and Registrar from MNNIT Allahabad signed the MoU.

The present MOU between PPGCL and MNNIT shall broadly cover (but not limited to) mutual collaboration in the following areas:

- 1 Technical support and expertise of MNNIT experts may be taken on environmental, water, plant technical issues as well as for switch-yard civil structural study, stability studies, etc.
- 2 The parties shall also collaborate for up-gradation of IT systems in PPGCL, including introduction of new technologies like Data Analytics, Artificial Intelligence (AI), Machine Learning and Robotics with emphasis on improvement in Power Plant Technologies and facilitating better decision-making. The parties shall agree and enter into modalities for the same, as per and if the need may so arise at time hereinafter.
- 3 PPGCL and MNNIT shall also collaborate for facilitating joint thesis/research projects and special projects on power plant problems, energy and allied technologies including renewable to be done by B.Tech/M.Tech. students and research scholars.
- 4 PPGCL shall provide experts with industry experience as faculties for taking lectures explaining power plant practical aspects and best industry practices for the benefit of MNNIT students.
- 5 The parties shall explore opportunities for development of courses and curriculums customized to industry requirements, especially in the field of Power Plant Technologies.
- 6 Plant visit, vocational training programmes and other activities of non-commercial nature which will facilitate to study of MNNIT students/researchers shall be arranged at PPGCL.
- 7 The parties shall in furtherance of their respective interest, pursue collaboration for development of new products and technologies, joint publications and patents/intellectual property rights in power plant technologies and allied areas.
- 8 PPGCL may, it may so desire, provide sponsorship for technical fests, exhibitions/cultural programs, sports events, institute journals and souvenirs, etc. at MNNIT & may organize quizzes, debates or other such programs for the academic and co-curricular development of the students of MNNIT.
- 9 Every year, celebration of Engineers Day, National Technology Day, World Environment Day, etc. may be taken up the parties jointly or severally.
- 10 Quality testing may be carried out by MNNIT at or on behalf of PPGCL as per requirement.
- 11 The parties shall also pursue collaborative ventures in grassroots technologies targeted at the development of people and areas in the vicinity of MUNPL units through the Community Development (CD) AND Corporate Social Responsibility (CSR) programs of PPGCL.
- 12 Any other programme or partnership may be taken up jointly by mutual consensus of CEO (PPGCL) & Director (MNNIT).



Signing of MoU between MNNIT Allahabad and Wyton Pharmaceuticals & Agrotech Private Limited

Motilal Nehru National Institute of Technology Allahabad, Prayagraj signed Memorandum of Understanding (MoU) with Wyton Pharmaceuticals & Agrotech Private Limited Lucknow on November 25, 2021.

A Technology for developing two different herbal formulations was developed by Devendra Singh, Research Scholar under the guidance of Dr. Vishnu Agarwal, Head, Department of Biotechnology MNNIT Allahabad. This novel drug is not only effectively helpful in treating bacterial infections caused by different bacteria but also has anti-biofilm and anti-quorum activity, which hinders the bacterial biofilm and bacteria torque mechanism. The scientifically tested and well proven formulation claims to treat the infections caused by wide variety of bacteria effectively. This is the first and only formulation available in market which has scientifically proven anti-biofilm and anti-QS activity.



Awards & Honors

MNNIT Allahabad ranked among Top 10 CFTIs / Central University / Institute of National Importance (Technical) in Atal Ranking of Institutions on Innovation Achievements [ARIIA].

MNNIT Allahabad was ranked among Top 10 CFTIs / Central University / Institute of National Importance (Technical) in Atal Ranking of Institutions on Innovation Achievements [ARIIA].

ARIIA-2021 results was announced in 7 separate categories which include Centrally funded technical institutions like IITs, NITs, State Universities, State standalone Technical colleges, Private universities, Private standalone technical colleges, non-technical government, and private universities and institutions on December 29, 2021 by Hon'ble Minister of State, Dr. Subhas Sarkar, Ministry of Education, Govt. of India.



MNNIT Allahabad recognized as District Green Champion for Prayagraj

MNNIT Allahabad is hereby recognized as District Green Champion for Prayagraj District for the Academic Year 2020-21. The Institution has successfully set up the Swachhta Action Plan Committee, adopted and implemented best practices in the area of Sanitation, Hygiene, Waste Management, Water Management, Energy Management and Greenery Management.



एमएनएनआईटी के शिक्षक एवं पुरा छात्र विश्व के शीर्ष दो फीसदी विज्ञानियों में शामिल

मोतीलाल नेहरु राष्ट्रीय प्रौद्योगिकी संस्थान इलाहाबाद के 10 शिक्षकों और दो शोधार्थियों को दुनिया के शीर्ष दो फीसदी विज्ञानियों की सूची में जगह मिली है। स्टैनफोर्ड यूनिवर्सिटी की ओर से सर्वे के बाद यह सूची हर साल जारी की जाती है।

इसमें रसायन विभाग के डॉ. प्रदीप दत्ता, गणित विभाग के प्रोफेसर एम0 कुमार, डॉ. जी0 नाथ, मैकेनिकल इंजीनियरिंग के डॉ0 एस0के0 गुप्ता, भौतिकी विभाग के प्रोफेसर पी0पी0 सहाय, विद्युत विभाग के प्रोफेसर नन्द किशोर एवं प्रोफेसर राजेश गुप्ता, मैकेनिकल इंजीनियरिंग के प्रोफेसर अरुणेश दुबे, सूक्ष्म कणिका विभाग के प्रोफेसर हरनाथ कर एवं डॉ0 वाई0 के0 प्रजापति तथा इसी विभाग के दो पुरा छात्र डॉ0 आनन्द शर्मा और डॉ0 नवीन कुमार को इस सूची में जगह मिली है।

4 Star Rating awarded to Institute's Innovation Council (IIC) 3.0 : 2020-21

The annual performance result of Institute's Innovation Council (IIC) 3.0: 2020-21 was announced on December 1, 2021 by the Ministry of Education's Innovation Cell (MIC) and All India Council for Technical Education (AICTE). Institute's Innovation Council, MNNIT Allahabad was awarded Four [4] Star Rating which is also the best rating awarded to any Institute / University amongst all zones of India.

Best Paper Awards

- Dr. Abhishek Kundu, Department of Applied Mechanics, received best paper award for paper, "Investigation on shear layer instabilities and generation of vortices during shock wave and boundary layer interaction," Fluid Mechanics and Fluid Power (FMFP) Conference 2021. 27-29 December, 2021, BITS Pilani, Rajasthan, India.
- Dr. Arti Chouhan and Dr. Ashutosh Pandey, Department of Chemistry, received best paper award while Dr. Arti Chouhan also received "Indian Chemical Society Research Excellence Award" for the presentation (Oral) entitled "Band gap engineering of Cu@Zn-3PTZ Metal-organic framework composites", International Conference on Recent Trends in Chemical Sciences (RTCS-2021), Dec. 21-24, 2021.

International Conference on Communication & Signal Processing (VCAS 2021)

The flagship International conference on VLSI, Communication & Signal Processing (VCAS 2021), of Electronics & Communication Engineering Department, MNNIT Allahabad, was organized during Friday, 24th September 2021 to Sunday 26th September 2021.

Chief Guest of the inaugural session of the conference was the world fame academician and researcher Prof. Stefan Wabnitz, Professor in Electronics and Telecommunications, Department of Information Engineering, Sapienza University of Rome, Italy.

On this occasion, Director MNNIT Allahabad and Chief Patron of the Conference Prof. Rajeev Tripathi has appreciated the organization of VCAS 2021 and iterated that International Conferences like VCAS 2021 provide a perfect platform for young scientists and researchers to share their research work and ideas and collaborate with the eminent researchers from the relevant areas.

Prof. Sudarshan Tiwari, Patron of the conference, highlighted that VCAS 2021 is 4th edition of Annual International Conference organized by the Electronics & Communication Engineering Department, MNNIT Allahabad. Moreover, he motivated the delegates to enthusiastically participate in the conference.

Conference Chair of VCAS 2021 and Head of the Department, Prof. R. K. Nagaria has discussed various dimensions and opportunities provided by the conference to the delegates.

Webpage: <http://www.mnnit.ac.in/vcas2021/>

Number of participants attending: 98

Total number of papers received: 187

Total number of papers accepted: 69

Total number of papers rejected: 115

Proceedings: Under process to publish as a Lecture Notes in Electrical Engineering (LNEE), Springer Singapore.

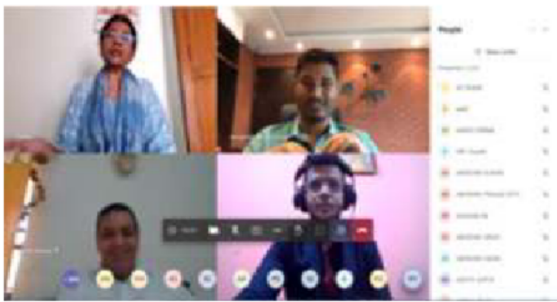
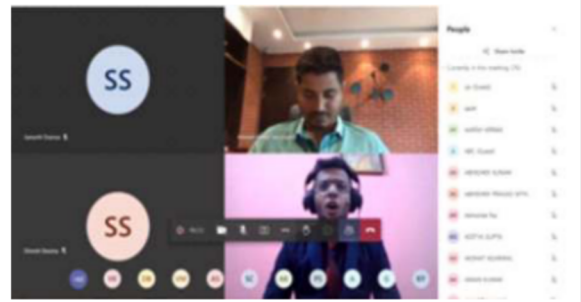


EVENTS

"My Story" Motivational Session by Successful Entrepreneur / Startup Manager was organized by Institute's Innovation Council (IIC)

1. A session on "My Story – Motivational Session by Successful Innovators" was organized by Institute's Innovation Council (IIC) on November 13, 2021.

Speaker: Dr. Shashwat Pathak, CEO of Atal Community Innovation Centre, MIET Meerut Foundation and a successful entrepreneur



1. A session on "My Story – Motivational Session by Successful Entrepreneur / Startup" was organized by Institute's Innovation Council (IIC) on November 13, 2021.

Speaker : Mr. Hemant Sah, Co-founder & CTO Drivezy

1. A session on "Entrepreneurship and Innovation as Career Opportunity" was organized by Institute's Innovation Council (IIC) on November 13, 2021.

Speaker: Mr. Lalit Ambastha, Founder & Patent Attorney, M/s Patentwire Consultants Pvt. Ltd., and IP Bazaar



Hon'ble Prime Minister Sri Narendra Modi Ji interaction with Director of Centrally-funded technical institutions

Hon'ble Prime Minister Shri Narendra Modi ji interacted with the Directors of Centrally-funded technical institutions through video conferencing. Hon'ble PM shared his vision for improving the educational institutions and journey towards Aatmanirbhar Bharat on date 08.07.2021



Diamond Jubilee Lecture Series

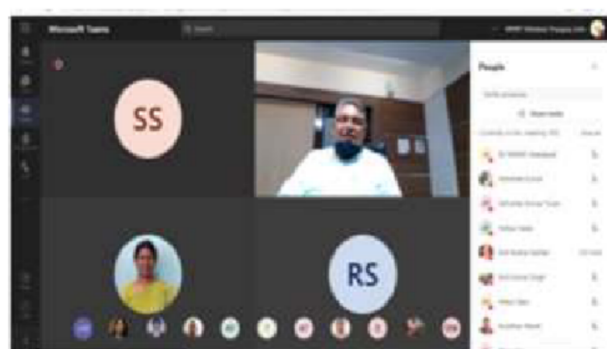
As part of diamond jubilee lecture series online webinar on the very relevant topic was organized as below:

Speaker : Prof. Ashok Misra, Distinguished Professor, National Academy of Science, India [NASI], IISc Bangalore and Former Director, IIT Bombay

Topic: A New Paradigm in Post Pandemic Education

Date: August 17, 2021

Time: 05:00 pm



Avishkar 2021

The Institute Annual Techno-Management Festival, AVISHKAR-2021 (AVISHKAR + Gnosiomania) was held during 26-29 December, 2021 in On-line mode. Organizing the Institute Festival online was a new and innovative idea and organized for the second time in online mode in our institute. The information of Avishkar was shared to students through through the Avishkar website (<https://avishkar.mnnit.ac.in/>) and social media platforms (<https://www.facebook.com/mnnit.avishkar>). Departmental Events like Cyberquest, Electromania, Genesis, Power Surge, Monopoly, Oligopoly, Robomania, Aerodynamix, Mechrocism, Rasayans, Gnosiomania, Kreedomania were conducted. The event TechToy was continued in this year also to support the government's initiative to encourage innovative ideas of toys making. Apart from the above, events were also conducted on alternatives for single use of plastics and azadi ka amrit mahotsav. Interested candidates participated in the events sitting at their home by connecting through Microsoft Teams and other software platforms by working in teams or as a lone wolf and prepared their respective presentations, projects, models and simulations accessible not only by the Event Coordinators but by the faculty as well.

More than 2500 participants finally participated after the initial screening and more than 60 events were conducted. The Avishkar was inaugurated on 26 December 2021 (Saturday) evening through MS Teams with live telecast to all users of MNNIT. Prof. Rajeev Tripathi, Director, MNNIT Allahabad, Chief Guest of the inauguration, renowned environmentalist Ms. Sumaira Abdulali, and many faculty members, staff members, and students with the online presence of more than 1200 attendees viewed the online inauguration. Other prominent gnotalks speakers were Lt. General Vinod Bhatia (former DGMO and Director for Joint Welfare Studies), Rajni Shekhar Sibal (writer and retired IAS officer), Dr. P. V. Venkitakrishnan (former Director of ISRO Propulsion Complex).

Gnosiomania quizzes were conducted by quiz-masters, Mr. Lokesh Kaza and Mr. Somnath Chanda.

In Avishkar 2021, Ananya Madaan (BTech 2nd year Chemical Engineering) won Ms. Avishkar title and Mr. Avishkar was won by Utkarsh Rai (BTech 3rd year Computer Science and Engineering) due to their best performance.



संस्थान के नवनियुक्त कार्मिक हेतु तीन दिवसीय प्रशिक्षण कार्यक्रम

मोतीलाल नेहरू राष्ट्रीय प्रौद्योगिकी संस्थान इलाहाबाद द्वारा संस्थान में नवनियुक्त कार्मिकों को प्रशिक्षण हेतु तीन दिवसीय (25.08.2021–27.08.2021) प्रशिक्षण कार्यक्रम का आयोजन किया गया। प्रशिक्षक के रूप में श्री कन्हैया चौधरी जी, सेवानिवृत्त, निदेशक (Special Duty)/संयुक्त सचिव स्तर, भारतीय कृषि अनुसंधान परिषद (ICAR) नई दिल्ली को आमंत्रित किया गया था। इस तीन दिवसीय कार्यक्रम के द्वारा नवनियुक्त कार्मिकों को भारत सरकार एवं संस्थान के विभिन्न नियम, अधिनियम एवं कार्यालय पद्धति के बारे में विधिवत जानकारी प्रदान करना की गई।



Publications

- Abhishek Kundu, Murugan Thangadurai, Gautam Biswas, *Investigation on shear layer instabilities and generation of vortices during shock wave and boundary layer interaction*, *Computers & Fluids*, Vol. 224, Issue 104966, PP 1-7, Year 2021, Impact Factor: 3.013.
- Nahid Rehman and Anjana Pandey, *An overview of Covid-19 and its vaccines*, *Biology Bulletin Review*, Vol. 11, PP: 47-64, Year 2021, Impact Factor: 0.39.
- Dutta, K., Basu, D. & Agrawal, S., *Evaluation of seasonal variability in magnitude of urban heat islands using local climate zone classification and surface albedo*, *International Journal of Environmental Science and Technology*, Vol. <https://doi.org/10.1007/s13762-021-03602-w>, Year: August 2021, Impact Factor: 2.860 (2020).
- Dutta, K., Basu, D. & Agrawal, S., *Synergetic interaction between spatial land cover dynamics and expanding urban heat islands*, *Environmental Monitoring and Assessment*, Vol: 193:184, PP: 1-22, Year: 2021, Impact Factor: 2.513 (2020)
- Deepak Kumar Singh and Priyaranjan Pal, *Forced Vibration Analysis of Stiffened Lock Gate Structure* *Journal of Sound and Vibration*, Vol. 510, PP: 116278, Year: 2021, Impact Factor: 3.655
- Dhanai, P.; Singh, V. P. and Soni, P., *Rainfall Triggered Slope Instability Analysis with Changing Climate*, *Indian Geotechnical Journal*, Year: 2021, Impact Factor: 1.393
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Patent Applications Filed

| S.No. | Title | Name of Faculty | Application No. | Date of Filing | Date of Publication (U/S 11A) | Application Status |
|-------|--|---|-----------------|----------------|-------------------------------|----------------------------------|
| 1. | Detox Candle for on-site Detoxification of Lignocellulose Hydrolysate and Method of Fabrication Thereof | Dr. Sangeeta Negi Mr. Ajay Kumar Pandey | 202111033291 | 23-07-2021 | 29-10-2021 | Awaiting Request for Examination |
| 2. | A Process For The Treatment Of Dye-Contaminated Wastewater And Simultaneous Bioelectricity Generation | Ms. Roma Agrahari Dr. Radha Rani | 202111036172 | 10-08-2021 | 29-10-2021 | Awaiting Request for Examination |
| 3. | A Portable Photovoltaics Powered Standalone Hybrid Power Supply System with Multi-Port Connectivity for Disinfection Devices | Prof . Rajesh Gupta Mr. Ajeet kumar Bhardwaj Mr. Anil Kumar Mr. Aman Kumar | 202111046806 | 13-10-2021 | 29-10-2021 | Awaiting Request for Examination |
| 4. | An Artificial Intelligence Based Enhanced Surveillance System and Method | Dr. Dushyant Kumar Singh Prof. Dharmender Singh Kushwaha | 202111057419 | 09-12-2021 | | Application not yet published |

Granted Patent

| S.No. | Title | Name of Faculty | Application No. | Date of Filing | Date of Publication (U/S 11A) | Application Status |
|-------|---|--|-----------------|----------------|-------------------------------|--|
| 1. | Electrochemical process of immuno-based thionine doped nanosilica electrode modification and its use as an enzymatic sensor for electrochemical detection of platelet hyperactivity | Prof. P. Chakrabarti Ms. Priti Singh Dr. Sunil Kumar Singh | 1687/Del/2015 | 05.06.2015 | 11-03-2016 | Granted Application Patent Num : 375935 Certificate Issue : 31-08-2021 |

Recently Awarded Externally Funded Projects

| | |
|-----------------------------------|--|
| 1) Research Project Topic: | Effect of boundary layer growth on blast wave mitigation studies inside the shock tube |
| <i>Funding agency:</i> | Science and Engineering Research Board (SERB) |
| <i>Name of Faculty member:</i> | Dr. Abhishek Kundu |
| <i>Name of the Department:</i> | Applied Mechanics |

The strategy sectors and defense industries are looking towards the efficient blast wave mitigating and attenuating structures to protect military vehicles from blast. Conventionally, the blast waves are produced through field tests in the free field which are harmful to environment. Recently, shock tube with small driver section is used for producing the blast wave rather than explosive test. The growth of boundary on the inner surface of the shock tube is of concern as it is an artifact compared to the field test. The boundary layer inside the shock tube causes complex flow field while performing the mitigation/attenuation studies which is neglected in actual shock tube experiments.

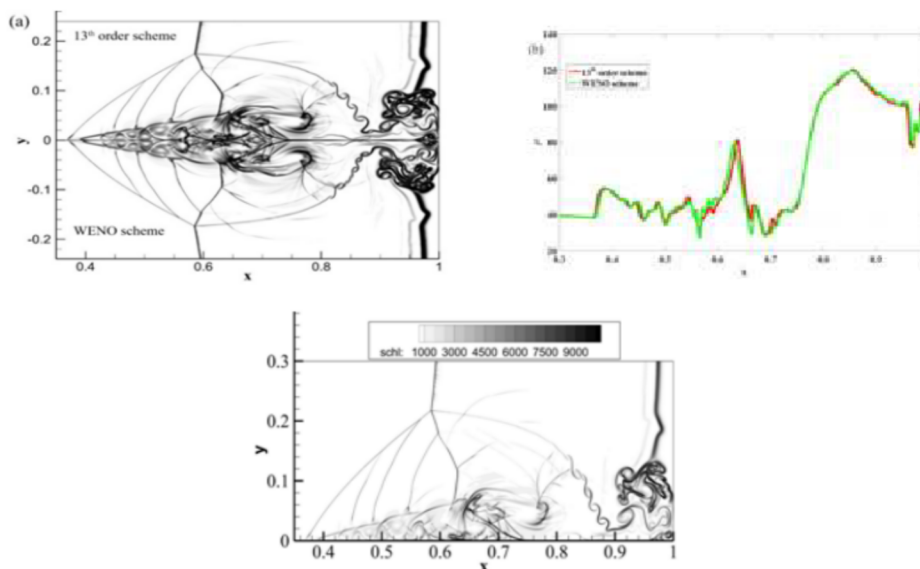


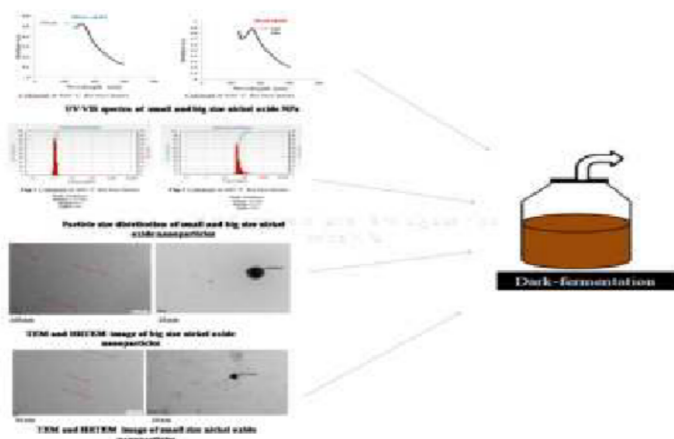
Figure: Sample results of shock wave boundary layer interaction problem

Outcome of the project: Technology transfer

| | |
|-----------------------------------|---|
| 2) Research Project Topic: | Augmentation of fermentative biohydrogen production by using nanoparticles and immobilization techniques for mitigating biowastes |
| <i>Funding agency:</i> | DST |
| <i>Name of Faculty member:</i> | Prof. Anjana Pandey (Mentor), Priya Rai (PI) |
| <i>Name of the Department:</i> | Biotechnology Department |

Inclusion of nanoparticles in augmentation of biohydrogen production using vegetable peel waste has increased the production level as compared to control. In the current study, two different sizes of nickel oxide nanoparticles were studied on the enhancement of biohydrogen production. The different concentrations were

0.65mg/L, 0.55mg/L, 0.45 mg/L, 0.35 mg/L, 0.25 mg/L, 0.15 mg/L, and 0.05 mg/L for same size nickel oxide nanoparticles. After application, it was found that application of big size nickel oxide in fermentation medium produced 2384 ± 67.8 mLH₂/fermentation medium while small size nickel oxide nanoparticles produced 2508.5 ± 82.7 H₂ mL/fermentation medium. Thus, the result showed that the application of small size nickel oxide nanoparticles exhibited significant production in comparison to big size nickel oxide nanoparticles.



Outcome of the project:

Patent application/technology transfer: Impact of size dependant study of nanoparticles on augmentation of biohydrogen production will be communicated.

3) 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:

CED

Mapping of Groundwater Quality Depleted area, Potential Groundwater Recharge Zones and Evolving the Farmer's need based Groundwater Recharge structures in District Mahoba of Bundelkhand region of Uttar Pradesh. Followings are sub-objectives under the major objective.

- 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..

Outcome of the project:

Patent application/technology transfer : Ongoing

4) Research Project Topic:

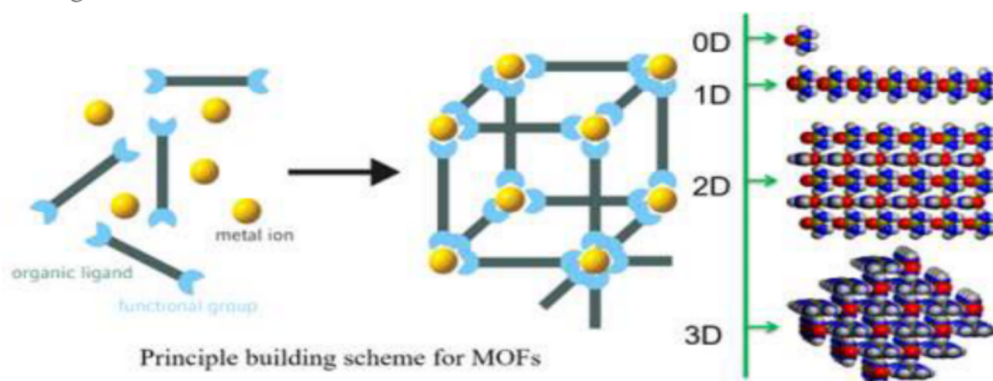
Syntheses, Characterisations and Applications of Luminescent Metal Organic Frameworks

Funding agency:

Department of Science and Technology, India

Name of Principal Investigator: Dr. Arti Chouhan
 Name of Faculty Mentor: Dr. Ashutosh Pandey
 Name of the Department: Department of Chemistry

In this project, metal organic frameworks are to be synthesised through hydrothermal or solvothermal methods. Luminescent MOFs are synthesised by combining the relevant organic ligands with metal ions. Synthesized metal organic frameworks will be employed for developing ratio metric luminescent sensors, catalysts and white-light-emitting materials.



Outcome of the project:

1. Arti Chouhan, Ashutosh Pandey, Sadhana Singh, and Subia Ambreen. (2020) "A 4-Pyridyltetrazole-based Zinc Metal-organic framework for photocatalytic degradation of methylene blue". Journal of the Indian Chemical Society, vol. 97, no. 10 A, 1626-1630. (Impact Factor: 0.284)
2. Indian Chemical Society Research Excellence Award, 58th Annual Convention of Chemists, 2021 & International Conference on "Recent Trends in Chemical Sciences (RTCS-2021) organized by Indian Chemical Society, Dec. 21-24, 2021.
3. Indian Chemical Society Research Excellence Award, 57th Annual Convention of Chemists, 2020 & International Conference on "Recent Trends in Chemical Sciences (RTCS-2020) organized by Indian Chemical Society, Dec. 26-29, 2020.

5) Research Project Topic:

"Design and development of a patch antenna based non-invasive blood sugar monitoring system"

Funding agency:

Council of Science and Technology, Uttar Pradesh

Name of Faculty member:

Dr. V.S. Tripathi (Professor)

Name of the Department:

Department of Electronics and Communication Engineering

The main objective of this project work is to design a microstrip patch antenna for non-invasive monitoring of blood glucose levels. Blood glucose monitoring is needed to manage the diabetes on a regular basis. Invasive methods are costly, risky, and painful. So, non-invasive blood glucose monitoring systems are being developed. Some non-invasive measurement techniques are being developed and research is going on this area. This project work focuses on use of electromagnetic wave for glucose levels measurement. The technique is based on relating to shifting in the resonant frequency of patch antenna to the permittivity and conductivity of blood which in turn is related to the blood glucose levels measurement.

Outcome of the project:

Patent application/technology transfer (N.A.)

The microstrip patch antenna is designed and fabricated for glucose level detection in real-time which works as an RF sensor. Simulation of the proposed antenna has been carried out, with fabricated and measured results for glucose level monitoring. Some of the microstrip patch antennas have been fabricated and measured in the lab for experimental validation of glucose monitoring with a non-invasive technique.

1. Designed an Electromagnetic Band Gap-Based Complementary Split Ring Resonator Loaded Patch Antenna for Glucose Level Measurement.
2. Designed a novel CSRR Loaded Truncated Patch Antenna for Non-Invasive Blood Glucose Monitoring Application.
3. Designed a stacked patch MIMO Antenna with circular polarization for Non-invasive Blood Glucose Monitoring Application.
4. Designed of SRR Loaded Patch Antenna based on ANN for Non-Invasive Blood Glucose Monitoring.
5. Designed a novel antenna design for Non-Invasive Blood Glucose Measurement and its Sensitivity Optimization using ANN.

6) Research Project Topic: Study on Cyber-physical Approach for Electric Power Grid
Funding agency: SERB, India, New Delhi
Name of Faculty member: PI: Prof. Nand Kishor, Co-PI : Prof. Shubhi Purwar
Name of the Department: EED

Outcome of the project: Patent application/technology transfer

7) Research Project Topic: *Integrated Renewable Resources and Storage: Operation and Management [IReSOpm]*
Funding agency: DST-RCN
Name of Faculty member: PI: Prof. Richa Negi, Co-PI: Prof. Asheesh Kumar Singh
Name of the Department: EED

Outcome of the project: Patent application/technology transfer

8) Research Project Topic: Developing a Model for Effective Adoption of Solar Energy System in India
Funding agency: ICSSR
Name of Faculty member: PI: Dr. Ganesh Sahu, Co-PI: Prof. Asheesh Kumar Singh
Name of the Department: EED

Outcome of the project: Patent application/technology transfer

9) Research Project Topic: E- Mobility: An Electricity Grid Perspective [SPARC]
Funding agency: SPARC
Name of Faculty member: PI: Prof. Asheesh Kumar Singh, Co-PI: Prof. S.N. Singh, IIT Kanpur
Name of the Department: EED

Outcome of the project: Patent application/technology transfer



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अधिष्ठाता (शोध एवं परामर्श)
Dean (Research & Consultancy)
मोतीलाल नेहरू राष्ट्रीय प्रौद्योगिकी संस्थान इलाहाबाद
प्रयागराज-211004 (भारत)
Motilal Nehru National Institute of Technology Allahabad
Prayagraj - 211 004 [India]

Phone : 0532 - 2271033, 34 | email : deanrc@mnnit.ac.in | Website : www.mnnit.ac.in/rnc