



**OPJU**

UNIVERSITY OF STEEL TECHNOLOGY  
AND MANAGEMENT

# yantriki

**Bi-Annual Newsletter**

**January - June 2023**

**Volume - 1 Issue - 1**



**OP JINDAL UNIVERSITY**

**DEPARTMENT OF MECHANICAL ENGINEERING**

### Message by the Vice Chancellor

As the Vice Chancellor of our esteemed university, I take immense pride in acknowledging the Department of Mechanical Engineering as one of the cornerstones upon which our institution stands. From its inception, this department has been a driving force behind our university's growth and development. Our department boasts an exceptional team of highly qualified faculty members, hailing from renowned institutes of Eminence and National Importance. Their diverse backgrounds and expertise create a rich tapestry of knowledge and experience, which in turn enriches the academic environment for our students, who come from various socioeconomic and cultural backgrounds.

It is with great enthusiasm and joy that I extend my heartfelt congratulations on the release of the inaugural edition of our bi-annual newsletter, "Yantriki". This newsletter is not just a publication; it is a labor of love, a testament to the collective efforts, ideas, and actions of both our dedicated students and esteemed faculty members. "Yantriki" serves as a panoramic window into the department's achievements and activities. It provides a bird's eye view of the remarkable journey that the Department of Mechanical Engineering has undertaken, showcasing the mechanical gems that have emerged from our academic community. I extend my deepest gratitude to the entire team of faculty and staff for their dedication and hard work in bringing this wonderful jewel into existence. May "Yantriki" continue to shine brightly, illuminating the path for future mechanical engineers and enthusiasts while fostering a sense of unity and pride among our academic family.



**Dr. R.D. Patidar**  
Vice-Chancellor

### Message by the Dean & Head of Dept. of Mechanical Engineering



**Dr. Siddharth S. Chakrabarti**  
Dean & Head of Dept. of Mechanical Engineering

It fills me with great joy to introduce the inaugural issue of "Yantriki" the Bi-annual Newsletter of the Department of Mechanical Engineering. This newsletter represents a collaborative effort from our dedicated faculty and staff, aimed at providing a comprehensive overview of the department's achievements and a glimpse into the numerous events attended, conducted, and conquered by our students, faculty, and staff. Within the pages of "Yantriki" you will find not only articles on our recent accomplishments but also insights into the latest technological advancements that promise to pique your interest and curiosity. Our devoted team has spared no effort in bringing you enlightening articles, motivating success stories, and the latest discoveries from the forefront of research. This publication not only mirrors the excellence of our department but also stands as a source of inspiration for future generations of mechanical engineers. I extend a warm invitation to all to delve into the magazine, celebrate our triumphs, and draw inspiration from the remarkable work within our department. My

heartfelt gratitude goes out to all those who contributed their time, energy, and expertise to make this endeavor a reality. Together, let us continue to strive for excellence in the ever-evolving field of mechanical engineering.

## About Mechanical Engineering Department

The Mechanical Engineering Department is well known for its quality of teaching and supportive environment provided to the students. The state-of-the-art laboratories, highly qualified, experienced and dedicated faculty and staff members in all specializations of Mechanical Engineering, make this Department a vibrant place to study. Our programs provides flexible curriculum enabling the students to achieve their goals and make them industry ready. Presently department is active in various thrust areas of research in Mechanical Engineering and allied branches.

### INSIGHTS OF MECHANICAL @ OPJU

- AICTE-CII Industry Linked Award 2021
- Highest star rating (3.5) in Institutional Innovation Council- 4.0
- Artificial Intelligence and Machine learning
- Mechatronics, Robotics & Automation
- Industry 4.0 and Data Science
- Six Sigma & Reliability
- Theory of Constraints in Manufacturing
- Experiential learning – 6-month long term internship in the final year
- Design Thinking & Innovation
- Industrial Engineering & Production Management
- Certificate course on Emerging technologies

### CENTRE OF EXCELLENCE

- Centre of Excellence in Manufacturing & Automation
- Centre of Excellence in Robotics
- Central Workshop

Industry Tailored Courses	Major Laboratories
Digital Manufacturing	Centre of Excellence in Manufacturing & Automation
Solar Energy Technology	Centre of Excellence in Robotics
Design and Development of Electric Vehicles	Material Design and Tribology Lab
Advanced Welding Technology	Mechanical Vibration Lab
CNC & Additive Manufacturing	Electric Vehicle Lab
CAD/CAE Certificate Courses	CAD/CAM Lab
Six Sigma & Reliability	15MW Turbine-Generator Lab
Plant Maintenance & Safety	Energy Systems Lab
Stainless Steel with JSL	Modelling & Simulation Lab
Hydraulic and Pneumatic - Bosch Rexroth	Mechanical Characterization Lab
Industrial IoT- Bosch Rexroth	Aerodynamics & Solar Energy Lab



## Training / Workshop

The Department of Mechanical Engineering, O.P. Jindal University, organised a workshop cum hands-on training program on “Arduobotics Robotics” on 16–17 , February 2023. the workshop was organized in association with Technex'23 - IIT Varanasi, a joint venture of Technex, IIT Varanasi & Innovians Technologies On the last day of workshop a small competition was organised and two best- performing teams of the workshop will get direct entry in the final round of competition Technex'23 to be held at IIT Varanasi in the month of March 2023.



It is critical to cultivate an innovative mindset in students. Keeping this thing in mind, a one-day visit to OPJU innovation center, for final year students of the<sup>nd</sup> Department Mechanical Engineering was organised on 22 Feb, 2023. Students had a hands-on experience on CNC cutting, laser cutting, and 3D printing machine. These skills will be beneficial for their final year project, future job and career prospects.



The Centre of Excellence in Manufacturing and Automation (CoEMA), in association with the Department of Mechanical Engineering have successfully organized a five-days CNC training program during 20 - 24th February 2023, for the final year Diploma Students of Kirodimal Government Polytechnic Institute, Raigarh. The students had hands-on training session in CNC Milling, CNC Lathe CNC engraving, CNC laser cutting and 3D printing. The students also learned about Robotic Welding technology available at OPJU.



The Department of Mechanical Engineering organized a Five days training program (17 – 21 March 2023) for the Faculty and Staff on "CNC Wire Cut EDM". The Five axis fully automatic CNC, EDM machine is the latest addition in the Centre of Excellence in Manufacturing and Automation under Department of Mechanical Engineering.

Dr. R. D. Patidar, Honorable Vice Chancellor, OP Jindal University inaugurated the Vritika Research Internship program, which the Department of Mechanical Engineering is organizing in collaboration with the Centre of Excellence in Manufacturing and Automation, OP Jindal University Raigarh. This one-month program aims to provide young scholars with hands-on research skill development experience and inspire them to pursue research-oriented careers. The program is sponsored by the Science & Engineering Research Board (SERB), Department of Science and Technology (DST), Govt of India, under the Accelerate Vigyan Vritika scheme.





## Yantriki / Bi-Annual Newsletter 2023

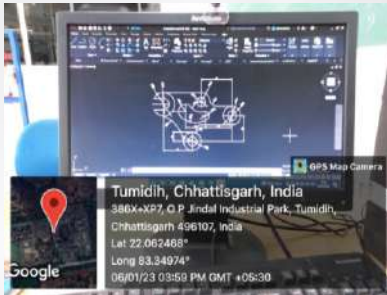
Department of Mechanical Engineering in association with the Career Development Centre (CDC), OPJU organized a session on "How to face interview?" on 17 March 2023 for the final-year Mechanical students.



Dr. R. D. Patidar emphasized the significance of our dedication to providing learners with hands-on skills, exposure to the industry, and abundant opportunities for personal and professional development. This reflects our unwavering dedication to nurturing a generation of confident and competent professionals.



The Department of Mechanical Engineering in association with the Centre of Excellence in Manufacturing and Automation (CoEMA) at OPJU, organized a Training Program Codes and Standard in Welding for the Steel Structural Division of Jindal Steel & Power on 6 & 7 July 2023. The training was related to Basics of welding, WPS and PQR as per AWS D1.1 and IS, EN ISO 1090, EN ISO3834, ISO 5817, NDT, Grouping of materials, Welding qualifications, coordination, inspection and testing.



The Department of Mechanical Engineering organized a 2-week online training program on "AUTOCAD" during 03rd – 14th January 2023, for the students of the 8th semester. The program was organized with an aim to hone the skill sets of the final-year students, who have recently completed their 6 months long term internship in various reputed organisations. The training was delivered by Ms. Leena Behara, Lab Instructor, Department of Mechanical Engineering. training was delivered by Ms. Leena Behara, Lab Instructor, Department of Mechanical Engineering.

To give the Diploma final year students an exposure to the software and to improve their Employability skills, the Department of Mechanical Engineering, OP Jindal University, Raigarh in association with SAE OPJU Collegiate Club and Academic Staff College (ASC) is going to organize a one-week online Workshop on Auto CAD Mechanical from 03.04.2023 to 11.04.2023.



Department of Mechanical Engineering organized Five days workshop during 24th – 28th April 2023 for the 8th semester students in association with Career Development Cell, OPJU Raigarh. The key objective of the workshop was to make students ready for campus interviews. The workshop covered various important aspects to be known by a fresher attending a job interview and was well-received by all the students.



The Department of Mechanical Engineering in association with Modelling and Simulation Lab organized a value-added course on "Solidworks and ANSYS CFD" from 15th to 19th May 2023, for the students of 6th semester. The students learned the concept of creating a model through Solid Works and used the model to simulate the performance of systems.



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The Department of Mechanical Engineering, in association with the Centre of Excellence in Manufacturing and Automation and the OPJU Innovation Center organized 3 days (22 to 24 May 2023) student workshop on 3D printing and laser cutting



The Department of Mechanical Engineering in association with the Centre of Excellence in Manufacturing and Automation (CoEMA), Institution Innovation Council (IIC), Fronius India Private Limited has successfully concluded a monthlong Industrial Internship Program for B.Tech students from other esteemed Institutions. The internship provided hands-on learning opportunities to develop welding skills using both virtual and real equipment.

Department of Mechanical Engineering organized Mock Interview sessions during 11 –12 May 2023 for the 8 semester students in hybrid mode the key objective of the program was to make students ready for campus interviews.



The Department of Mechanical Engineering in association with the Centre of Excellence in Manufacturing and Automation (CoEMA), Institution Innovation Council (IIC), Fronius India Private Limited has successfully concluded a month-long Industrial Internship Program for B.Tech students from other esteemed Institutions. The internship provided hands-on learning opportunities to develop welding skills using both virtual and real equipment. key also engaged in non-destructive testing and attended expert lectures on manufacturing advancements.





## Social Activities

The Department of Mechanical Engineering (OPJU) in association with NSS (OPJU) organized an Awareness campaign on “My Village, Clean Village”, “Importance of Voting”, “Dengue” and “Save Soil” under the AICTE Activity Points Programme at Samaruma village, Punjipathra on 18<sup>th</sup> April, 2023. In the program about 44 students of 8 semester actively participated. The students formed groups and interacted with the villagers on technical aspects of saving soil, dengue, and created awareness about voting rights.



The Department of Mechanical Engineering (OPJU) in association with NSS (OPJU) organized an Awareness campaign on “Clean Village”, “Dengue”, “Voter Awareness” and “Save Soil” under the AICTE Activity Points Programme at Punjipathra village on 16<sup>th</sup> May 2023. In the program about 40 students of 8 semester actively participated. The students formed groups and interacted with the villagers on technical aspects of saving soil, dengue, and created awareness about voting rights.



## Invited Expert Talk

Dr. Mukesh S Desai, Associate Professor, Department of Mechanical Engineering delivered an expert talk on the topic "How to Prepare for Campus Drive" at Govt Polytechnic Rengali, Sambalpur, Odisha on 08th May 2023.



The Department of Mechanical Engineering in association with the Research and Development Cell organized an expert talk on the topic “ The Applications of Thermal and Fluid Engineering ” on 18 May 2023. The speaker for the session was Dr. Sunil Kumar, Texas AM University, USA, he discussed in detail the importance of thermal and fluids engineering. 100+ participants attended the session.



## Industrial Training

The Department of Mechanical Engineering organized industrial visit at Jindal Power Limited, Tamnar and Dongamahua Captive Power Plant for the 6th semester students on 24 March 2023. Students got an exposure to the basics working of thermal power plants.



Industrial training is a vital part of the curriculum at OP Jindal University, Raigarh to make students Industry ready. In order to expose students to the real world of work, latest technologies, and specific practices in their respective fields of specialties. The Department of Mechanical Engineering organized two-week training for Diploma Engineering students at Nalwa Steel and Power Limited (NSPL), Raigarh and Steel Structural Division (SSD), JSP Raigarh.



## SAE & Other Competition

OP Jindal University student's team "VIDYUT" under the aegis of SAE India Collegiate Club is working extensively on their Formula One car project "VAYU". The team has completed the designing and fabrication part of Chassis. The team members are really excited to participate in the formula contest SAE-SUPRA which is scheduled to be held during July 2022 at Buddh International Circuit, Greater Noida. Last year, OPJU was the only University from Chhattisgarh to participate in this event.





The talented student team Vidyut is working extensively on their project for the upcoming F1 racing car event, SAE - SUPRA 2023 scheduled to be held at Buddha International Circuit, Greater Noida during 10th – 13th July 2023. As members of the SAE OPJU Collegiate Club, these students demonstrate the University's motto of "learning by doing." Throughout the journey of building the racing car, the team has actively engaged in techno-commercial discussions and knowledge-sharing sessions. It's a fantastic opportunity for hands-on learning and growth. Wishing the team all the best in their endeavours!



Team "Vikrant" comprising of the students from the Department of Mechanical and Electrical engineering, OP Jindal University participated in a National level event SIEP- Electric Bike Challenge during 14th - 18th April 2023 organized by ISIE, India at Galgotia University. The Department of Mechanical Engineering congratulates Mr. Shikhar Pandey, Mr. Ranveer Singh, Mr. Jayant Shekhar Singh, Mr. Rohan Sharma, Mr. Shubham Ku. Thakur and Mr. Anuj Sangwan, 4th semester students for successfully participating and representing the University at National level.



## Student Projects

On June 2<sup>nd</sup>, 2023, the Department of Mechanical Engineering hosted a project exhibition for the 8th-semester B.Tech students. The event showcased the remarkable work of the final-year students, who exhibited great enthusiasm while presenting their projects to the Honourable Vice Chancellor Dr. R.D. Patidar, mentors, and faculty members. After careful assessment two projects were selected for the Best Project Award. The details of the projects and project members are as follows:

### First prize

Design and structural analysis of Formula student vehicle  
Mr. Ayush Pandey, Mr. Gurjot Singh Saini, Mr. Yasharth Mishra,  
Mr. Shubham Kumar

### Second Prize

Artificial intelligence based autonomous metal detector robot  
Ms. Divya Kori, Mr. Prince Kumar Yadav, Mr. Pawan Kushwaha,  
Mr. Ranjeet Kumar, Mr. Harsh Patel

### Other Student Projects

- Solar Water Distillation Tree
- Design And Fabricate Cooling System Of Pv Panel For Efficiency Improvement
- Pv Panel Cleaning And Cooling For Electrical Efficiency Improvement Using Waste Water Reject Form Ro



## Achievements / Awards & Recognitions

OPJU congratulates Mr. Madina Sohit Swaroop, 8th semester student of the Department of Mechanical Engineering for successfully completing 8 weeks training program on "ANSYS" from Intern Shala.

OPJU congratulates Mr. Raju Kumar Yadav, student of 6th semester of the Department of Mechanical Engineering and his teammates, for securing first rank in the final round of competition organized during the National level workshop cum competition on "Ardubotics Robotics". The workshop was organized by OPJU in association with Technex'23 - IIT Varanasi, a joint venture of Technex, IIT Varanasi & Innovians Technologies. Mr. Raju Kumar Yadav along with his team mates will be representing OPJU in the final round of competition Technex'23 to be held at IIT Varanasi in the month of March 2023.

Our student team participated under the flagship of "Centre of excellence in Robotics" in association with "Department of Mechanical Engineering", OPJU in the national level annual Techfest event Technex'23 (84th edition of Asia's oldest Techno-Management fest) at IIT BHU, Varanasi. They successfully competed and won First Prize among 50+ teams across the country in robotics competition at IIT-BHU. Our students Mr Kishan Patel, Mr Raju Kumar Yadav and Mr Rajan Kapri secured the first position and won a cash prize of Ten thousand rupees (10K) along with excellence certificates.



OPJU congratulates Mr. Jayveer Singh, 4th semester M.Tech student of the Department of Mechanical Engineering, for successfully completing one month (08th February - 07th March 2023) online training in "Solar PV Installer (Suryamitra) Course". The course was organized by Eji-Learning in association with Power sector skills council skill India and National Skill Development Corporation.

The Department of Mechanical Engineering congratulates Mr. Shriyansh Verma, B.Tech 4th semester student for successfully completing the 12 week NPTEL course on "Fundamentals of Automotive Systems" offered during the session January-April 2023.





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- The Department of Mechanical Engineering would like to extend their congratulations to the students listed below for their outstanding performance in various events of the National Level Techno-Cultural Fest, Technorollix 2023, organized by OP Jindal University, Raigarh:

Somesh Chandra - 1<sup>st</sup> position in Aerodrone, 2<sup>nd</sup> position in Robowar, and 3<sup>rd</sup> position in Robosoccer

Rohan Sharma - 1st place in Talent Hunt, 1st place in Yuva Sadan, and 3rd place in Food Fieste

Vishal Pandey - 3rd place in Robowar

Shishir Santosh Mishra - 3rd place in Robo Race.



- The Department of Mechanical Engineering would like to congratulate the students listed below for their achievements in various categories of the Annual Academic Excellence Awards.

Best project - Mr. Ayush Pandey and team (8th sem.)

Best innovator - MR. Vishal Pandey (4th sem.)

Best Startup - Mr. Ankur Singh, Mr. Sanskar pandey and MR. Shivam Tiwari

Student facilitator (Boys) - Mr. Gurjot Singh (8th sem.)

Student facilitator (Girls) - Ms. Nikita Sahu

- The national institute of Solar Energy (NISE) working under the Ministry of New and Renewable Energy, Government of India organized a three days online Skill development program on Solar PV system design from 23rd January to 25th January 2023. Dr. Sidharth Chakrabarti and Dr. Kuber Nath Mishra participated in the program and were awarded the participation certificate. The program was a unique amalgamation of the theory of Solar energy utilization with industrial concepts currently prevailing in the solar industry. The program provided an insight into the well-established concepts of solar PV applications as well as solar thermal energy and power plant installations.



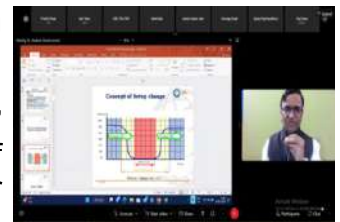
Mr. Rahul Ganpat Rao Makade received Doctoral Degree in Mechanical Engineering for his research work in the field of Solar Energy under the guidance of Dr. Siddharth Chakrabarti in 3rd Convocation ceremony of OPJU .

## Faculty Development Program (FDP)

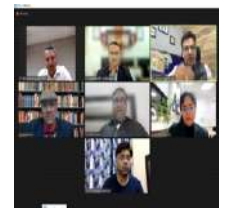
The Department of Mechanical Engineering organised a 2 days Faculty Development Programme on “Solid Works” during 12th and 13th January 2023. Faculty members of the various departments participated in the FDP and understood the advanced features of 2-D and 3-D modelling and analysis using SolidWorks.



Dr. Mukesh S Desai, Associate Professor, Department of Mechanical Engineering delivered an expert talk on the topic "Single Minute Exchange of Die (SMED) – A Lean Manufacturing Tool " in the two-week professional training in “Allied Tools and Techniques under Interdisciplinary Engineering Fields for Learning Sustainability” organized by the Department of Industrial and Production Engineering, School of Studies, Engineering and Technology, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.) during 05th – 16th June 2023



Center for Industry-Academia Collaboration (CIAC), OPJU, in association with Department of Mechanical Engineering and School of Management has organized an Online Panel Discussion on "Innovative Ecosystem & Practices" on January 16 at 6:30 PM. During the discussion the speakers stressed upon the fact that innovation must be relevant to the time and it comes from unconstrained thinking and Students must show a good attitude toward problem-solving, social skill development, and internships and must be people managers. The session was attended by 100+ enthusiastic participants



Department of Mechanical Engineering organized a 5 Days Online Faculty Development Program on “Recent Advancement in Heat Exchanger Technologies: Experimentation & Simulations” sponsored by Chhattisgarh Council of Science and Technology (CGCOST) in association with IRC IEEE, Institution Innovation Council OPJU (IIC), Chhattisgarh State Renewable Energy Development Agency CREDA), Solar Energy Society of India (SESI) and Academic Staff College OPJU (ASC) from March 13th - 17th, 2023 in online mode. Total 13 eminent speakers from foreign universities, IIT's, NIT's, and renowned Industries such as Griffith University, Australia, CSIR- CMERI Durgapur, IIT Mumbai, IIT Indore, IIIT Jabalpur, NIT Durgapur, NIT Raipur, L&T Mumbai, Tata Technologies and Thermax India, shared their valuable knowledge and expertise with the participants. The FDP was marked by an energetic and engaging knowledge-sharing experience, which saw the participation of 419 attendees from various regions across India.



Dr. Umesh Vishwakarma, Dr. Siddharth Chakravarti, Dr Mithilesh Sahu, Dr. Mahesh Bhiwapurkar, Prof. Jitesh Singh, Department of Mechanical Engineering participated in 5 days FDP on “Opportunities and Challenges in Artificial intelligence & Machine Learning for Mechanical Engineers” during 24<sup>th</sup> – 28<sup>th</sup> April 2023. The FDP was organised by Centre for Continuing Education, NIT Warangal.



Placements and selection on long term internship



## Research and patents Publications

- **Dr. Mithilesh Sahu**- Thermodynamic sensitivity analysis of SOFC integrated with blade cooled gas turbine hybrid cycle, Journal of Thermal Engineering (Published by Yıldız Technical University Press, İstanbul, Turkey).
- **Dr. Saroj Kumar**- Multi-target trajectory planning and control technique for autonomous navigation of multiple, ISA Transactions (Elsevier) robots.
- **Dr. Mithilesh Sahu** - Comparative studies on performance of plain, perforated, threaded, and threaded–perforated pin fin: A numerical approach, Heat Transfer Journal (Willey Publication).
- **Dr. Siddharth Chakrabarti** - Development of the Empirical model and Optimization of parameters for prediction of Condenser Vacuum pressure in Thermal Power Plant, IEEE Explore.
- **Dr. Mithilesh Sahu** - Comparison of the effect of CeO<sub>2</sub> and CuO<sub>2</sub> nanoparticles on performance and emission of a diesel engine fueled with Neochloris oleoabundans algae biodiesel, Materials Today: Proceedings.
- **Prof. Anurag Vijayawargiya, Dr. Mahesh Bhiwapurkar** - Effect of Lifting Weight, Height and Asymmetry on Biomechanical Loading during Manual Lifting, International Journal of Occupational Safety and Health.
- **Dr. Mithilesh Kumar Sahu, Dr. Siddharth Chakrabarti** - (Book) Sustainable Approaches and Strategies for E-waste Management and Utilization, Book Publisher : IGI Global.
- **Dr. Saroj Kumar** - Better Decision-Making Strategy with Target Seeking Approach of Humanoids using Hybridized SOARANN-Fuzzy Technique” in “Journal of Computational Science (Elsevier), Journal of Computational Science (Elsevier)
- **Prof. Jitesh Kumar Singh**- Study on the physical, mechanical, and thermal behaviour of RHN blend epoxy hybrid composites reinforced by Borassus flabellifer L. fibers, Cellulose (Springer
- **Prof. Dharmendra Singh Saini**- Optimization of predicted wear and friction for electroless Ni-P by RSM, Fuzzy logic and ANFIS using TOPSIS, Transactions of the Indian Institute of Metals-TIIM (Springer publications).
- **Dr. Siddharth Chakrabarti**- Review of Composite Desiccants and Their Properties for Rotary Dehumidifiers, European Chemical Bulletin.
- **Dr. Siddharth Chakrabarti, Dr. Satish Kanhed, Dr, Kalyan Phani, Dr. RD Patidar**- 120 2022 107 235, International, 23/01/2023
- **Prof Jitesh Singh, Dr. Satish Kanhed**- 2023/02070, International, 20/02/2023.
- **Dr. Siddharth Chakrabarti, Dr. Satish Kanhed, Dr, Kalyan Phani, Dr. RD Patidar** - 20 2023 100 029, International, 2-2-2023
- **Dr. Siddharth Chakravarti** - 380834-001, National, 06/03/2023

Dr. Siddharth Chakrabarti, Dr. Mahesh Bhiwapurkar, Dr. Mithilesh Sahu and Dr. Satish Kanhed presented their individual research paper during the International Conference on Mechanical Engineering: Researches and Evolutionary Challenges organized by the Department of Mechanical Engineering NIT Warangal during 23rd-25th June 2023. Dr. Satish Kanhed has won the the Best Paper Award in this prestigious conference.



## INSTRUMENTS ABOARD CHANDRAYAAN-3

*Radio Anatomy of Moon Bound Hypersensitive Ionosphere Atmosphere (RAMBHA) - This instrument is attached to the Lunar lander "Vikram". It will study the density of ions and electrons present just above the Moon's surface and also find out its properties*

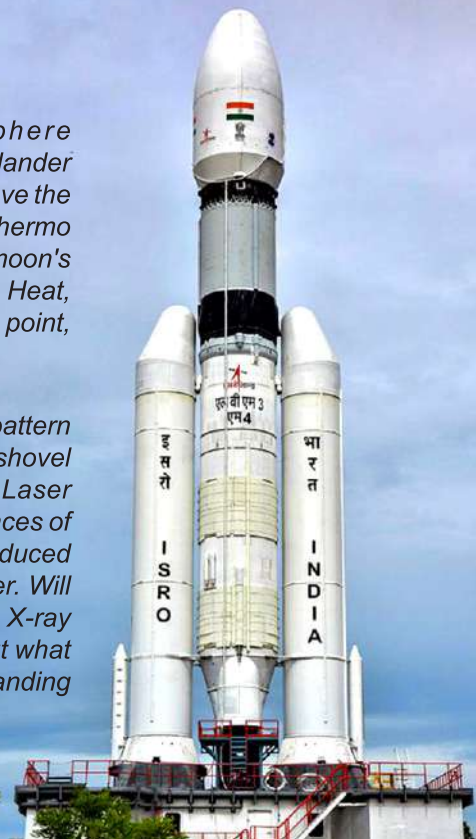
*Chandra's Surface Thermo Physical Experiment (ChaSTPE) - Study of thermal properties of the moon's surface, meaning answers to questions related to heat like-Specific Heat, Heat capacity, Thermal expansion, thermal conductivity, Melting point, thermal diffusivity and Thermal shock resistance.*

*Instrument for Lunar Seismic Activity (ILSA) - How is the seismic pattern around the place where Vikram will land? ILSA also has a tool like a shovel which will study its properties by scraping the surface layer.*

*Laser Retroreflector Array (LRA) - It will calm down and understand the nuances of the entire moon system and tell it to the whole world.*

*Laser Induced Breakdown Spectroscopy (LIBS) - This is attached with Pragyan rover. Will find out which minerals are buried in Chanda's womb*

*Alpha Particle X-ray Spectrometer (APXS) - These are also with the rover, they will find out what are the physical properties of the stones and soil present around the landing site.*



## **FUEL OF THE FUTURE: GAS HYDRATES**

Gas hydrates, a form of natural gas that forms when methane from the decomposition of organic material comes into contact with water at low temperatures and high pressures, could play a pivotal role in future fuel supplies. These gas hydrates could serve as a bridge to our energy future until cleaner fuel sources, such as hydrogen and solar energy, are more fully realized. Gas hydrates known as ice that burns, hold special promise for helping to combat global warming by leaving a smaller carbon dioxide footprint than other fossil.

Researchers suggest that gas hydrates, a form of natural gas typically found deep below oceans and permafrost, could in the near future supplement currently available fossil fuel energy sources that are in short supply.



Although scientists have known about gas hydrates for decades, their potential use as a fuel has only recently been considered. One reason for this is that they are hard to find: Gas hydrates, also known as "clathrates," form in cold, high-pressure conditions typically found deep below the oceans and underground on land in certain parts of the world, including the ocean floor and permafrost areas of the Arctic. But now, researchers have identified tremendous stores of gas hydrates throughout the world, including in the U.S., India, and Japan. In addition to Alaska, the U.S. has vast gas hydrate deposits in the Gulf of Mexico and off its eastern coast. The new discoveries are fuelling interest in gas hydrate research. Japan and India are leading the way with the largest, most well-funded hydrate research programs.

An estimated 85.4 trillion cubic feet of natural gas could potentially be extracted from gas hydrates in Alaska's North Slope region alone. "It's definitely a vast storehouse of energy, but it is still unknown how much of this volume can actually be produced on an industrial scale? That volume, depends on the ability of scientists to extract useful methane, the main ingredient in natural gas, from gas hydrate formations in an efficient and cost-effective manner.

One of the more promising techniques for extracting methane from hydrates involves simply depressurizing the deposits, he says. Another method involves exchanging the methane molecules in the "clathrate" structure with carbon dioxide. Workers can, in theory, collect the gas using the same drilling technology used for conventional oil and gas drilling.



## SOLAR FARM AT A LANDFILL SITE BRINGS NEW MEANING FOR WASTE TO ENERGY

*There may be a sustainable way to deal with all the junk we generate that ends up in landfills. The vast area currently occupied by the landfills could pave the way towards green energy production. The Mount Olive project in New Jersey is a model for turning a brownfield site into a “brightfield,” supporting cleaner power generation and providing a wealth of benefits for the local community.*



The U.S. Environmental Protection Agency (EPA) has reported that there are more than 10,000 closed landfills in the U.S. Reclamation of these sites is big business; many locations have been remediated and turned into parks, gardens, and well-known golf courses across the country.

Landfills also can host energy projects. Research groups, including the World Resources Institute, have said U.S. cities and counties announced more than 20 brownfield solar power projects in 2021, turning these sites into “brightfields,” with more than 200 MW of electricity generation capacity. More such projects are on the way, with additional tax credits available for landfills and other brownfield sites through the Inflation Reduction Act.

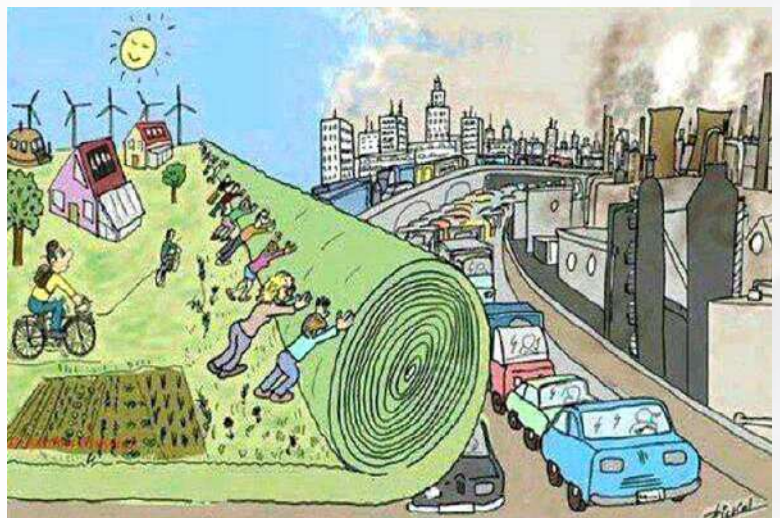
“Only a small fraction of the 10,000 closed landfills across the U.S. have been converted into solar fields,” said Chris Ichter, executive vice president at CEP Renewables, owner of the property and the group responsible for maintaining the landfill cap. “The unique structure we used to implement this project now serves as a model that can be leveraged to redevelop more closed landfills into revenue-producing assets that facilitate cleaner air, tax revenue, jobs, and more affordable energy for residents.”

### Innovative Equipment and Quality Control

*Solar farm projects atop landfill sites often require innovative fixed-tilt, ballasted mounting solutions, another solution to lessen the risk of damaging the landfill cap. Lindsay Precast, a company that has deployed more than 4,500 prefabricated solar skids, was hired by TMEIC to integrate TMEIC's Solar Ware Ninja inverters and medium-voltage transformer onto Lindsay's non-penetrating galvanized steel skids.*



Fun Zone





# पार नजर के यह कहानी मंगल ग्रह की है।

By: Dr. Jayant Vishnu Narlikar

मंगलवासी सतह के नीचे रहते थे। छोटू अपने पापा का सिक्वोरिटी पास लेकर सुरंग में चला गया। उसके पापा हर दिन उसी सुरंग से होकर अपने काम पर जाते थे। आम लोगों को उस रास्ते से जाने की मनाही थी, केवल चुनिंदा लोग ही जा सकते थे। छोटू के पापा की उस दिन छुट्टी थी इसलिए वह छिपाकर पास लेकर चल पड़ा था। छोटू ने पास को दरवाजे में बने एक खांचे में डाला और दरवाजा खुल गया सुरंगनुमा रास्ता ऊपर की ओर जाता था। छोटू आगे बढ़ा परन्तु निरीक्षक यन्त्रों द्वारा पकड़ा गया। निरीक्षक यंत्र ने छोटू की तस्वीर खींच ली और खतरे की सूचना सिपाहियों को दे दी। सिपाही छोटू को पकड़कर वापस उसके घर छोड़ आए। पापा ने उसे बचा लिया।

पापा ने छोटू को बताया कि वह जमीन के ऊपर काम करते हैं। आम आदमी वहाँ नहीं जा सकता क्योंकि वहाँ के माहौल में नहीं रह सकता। वह वहाँ स्पेस सूट पहनकर जाते हैं जिससे ऑक्सीजन मिलता है और खास किस्म के जूतों तथा प्रशिक्षण के कारण ही वहाँ चल-फिर सकते हैं।

पापा ने छोटू को बताया कि पहले ऐसा नहीं था। पहले मंगल ग्रह के सभी लोग जमीन के ऊपर रहते थे बगैर किसी विशेष सूट की मदद के परन्तु सूरज में परिवर्तन होने के कारण प्राकृतिक संतुलन बिगड़ गया। सभी पशु-पक्षी, पेड़-पौधे इसे सहन नहीं कर पाए और धीरे-धीरे समाप्त हो गए। केवल उनके पूर्वजों ने इसका सामना किया। उन्होंने तकनीकी ज्ञान के आधार पर जमीन के नीचे घर बना लिया और रहने लगे। धरती के ऊपर लगे विभिन्न यन्त्रों द्वारा वे सूरज की रोशनी और गर्मी का इस्तेमाल करते हैं। छोटू के पापा ने कहा कि वे और कुछ चुनिंदा लोग यंत्रों का ध्यान रखते हैं।

दूसरे दिन उसके पापा जब काम पर गए तो कम्प्यूटर से पता चला कि एक अंतरिक्ष यान मंगल ग्रह की ओर बढ़ रहा है और उसमें से एक यांत्रिक हाथ बाहर निकल रहा है। कॉलोनी प्रबंध समिति की मीटिंग बुलाई गई। अध्यक्ष ने बताया कि दो यान मंगल की ओर बढ़ रहे हैं। कॉलोनी की सुरक्षा की पूरी जिम्मेदारी नंबर 1 पर थी। उसने कहा कि उसके पास यान को समाप्त करने की क्षमता है परन्तु इससे उन्हें कोई जानकारी हासिल नहीं होगी। नंबर दो जो की एक वैज्ञानिक थे, ने नंबर की बात से सहमत होते हुए कहा कि अगर हम यान को नष्ट करते हैं तो दूसरे ग्रह के लोगों को हमारे बारे में जानकारी मिल जाएगी नंबर तीन जो सामाजिक व्यवस्था का काम देखते थे, ने कहा कि अगर दूसरे लोगों को हमारे बारे में पता चला तो हो सकता है वो अगली बार और भी सक्षम यंत्र भेजें इतनी देर उन्हें जानकारी मिली यान जमीन पर उतर चूका है।

उस दिन पापा छोटू को कंट्रोल रूम लेकर आए थे पापा ने छोटू को एक कंसोल दिखाया जिसपर कई बटन थे। अंतरिक्ष यान से एक यांत्रिक हाथ बाहर निकला और जमीन की ओर बढ़ने लगा। सब लोग स्क्रीन पर देख रहे थे परन्तु छोटू की नज़र कंसोल के ऊपर थी। छोटू ने कंसोल पर बने लाल बटन को दबा दिया। खतरे की घंटी बजी और सब कंसोल की तरफ देखने लगे। छोटू के पापा ने उसे एक थप्पड़ मारा और लाल बटन को पहले की तरह कर दिया परन्तु तब तक लाल बटन ने अपना काम कर दिया था और यांत्रिक हाथ की गतिविधि रुक गयी थी।

उधर धरती पर नासा ने अपना बयान जारी कर कहा कि मंगल की धरती पर उतरा हुआ अंतरिक्ष यान का यांत्रिक हाथ बेकार हो गया है। ठीक करने का प्रयास जारी है। इसके कुछ दिनों बाद अखबारों में छपा रिमोट कंट्रोल के सहारे यांत्रिक हाथों को ठीक कर दिया गया है। उसने मंगल के मिट्टी के नमूने लेने शुरू कर दिए हैं। पृथ्वी की तरह मंगल पर भी जीव सृष्टि का अस्तित्व है यह आज भी एक रहस्य है।



## A REAL LIFE STORY OF Dr. Jayant Vishnu Narlikar

Jayant Vishnu Narlikar is an esteemed Indian astrophysicist and cosmologist, renowned for his ground breaking contributions to the fields of astrophysics and cosmology. Born on July 19, 1938, in Kolhapur, India, Narlikar has left an indelible mark on the scientific community. Narlikar's academic journey led him to the University of Cambridge, where he earned his Ph.D. under the guidance of the legendary astrophysicist Sir Fred Hoyle. Together, they developed the famous Hoyle-Narlikar theory, challenging the prevailing cosmological model by introducing the concept of a steady-state universe.

Throughout his career, Narlikar made significant advancements in the study of cosmic microwave background radiation, black holes, and the nucleosynthesis of elements in stars. He also played a pivotal role in the establishment of several important research institutions in India, including the Tata Institute of Fundamental Research (TIFR) and the Inter-University Centre for Astronomy and Astrophysics (IUCAA). Jayant Vishnu Narlikar's tireless pursuit of knowledge and his dedication to advancing the frontiers of astrophysics have earned him numerous accolades, including the Padma Bhushan, India's third-highest civilian award. His legacy continues to inspire aspiring scientists worldwide, leaving an enduring impact on the world of astrophysics and cosmology.



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