Report
on
Monthly Faculty Lecture

Series	March, 2025-26

Date: 27th March, 2026; Time: 2:00 PM

Title: ADDITIVE MANUFACTURING: Journey from 2D to 6D and Beyond

On 27th March, 2026 the Monthly Faculty Lecture was held under the aegis of Swami Vivekananda University at NND block, Room No: 307, where **Dr. Kaushik Kumar, Professor in the Department of Mechanical Engineering at Birla Institute of Technology, Mesra**, Ranchi, delivered an insightful lecture on the critical topic of "ADDITIVE MANUFACTURING: Journey from 2D to 6D and Beyond." The event was graced by the presence of SVU officials, directors of various departments, faculty members, staff, and research scholars, making it a significant gathering of academic and professional minds.

Introduction

The session commenced with an opening address by **Prof. (Dr.) Ranjan Chakrabarti, Director, Research & Academic Development, SVU**, who highlighted the transformative evolution of manufacturing technologies, from basic 2D techniques to advanced multi-dimensional printing, enabling the development of smart and complex structures. With the growing demand for innovation in manufacturing, the topic resonated strongly with the audience. He was also introduced as the guest speaker, whose extensive academic experience and contributions set the stage for an engaging and forward-looking discussion on emerging trends and future prospects in additive manufacturing. The event was chaired by Prof. (Dr.) Anuradha Mukhopadhyay, Director, Science, Swami Vivekananda University, Former, Vice Chancellor, Diamond Harbour Women's University, West Bengal.

Key Highlights of the Lecture

Dr. Kumar's lecture encompassed various dimensions of additive manufacturing, presenting both fundamental concepts and advanced developments. The following key points were discussed in detail:

1. Evolution from 2D to 3D Printing

Dr. Kumar began by explaining the transition from conventional 2D printing, which involves flat surface printing, to 2.5D printing, where limited depth or texture is introduced. He then elaborated on 3D printing, which represents a revolutionary shift in manufacturing by

enabling the production of physical objects directly from digital 3D CAD models without the need for tools or fixtures.

He highlighted that 3D printing is also known by various terms such as:

- Additive Manufacturing
- Rapid Prototyping
- Layered Manufacturing
- Solid Freeform Fabrication

The fundamental principle involves layer-by-layer deposition of materials such as liquids, powders, or sheets to create complex geometries.

2. Classification of Additive Manufacturing Processes

The speaker discussed the classification of AM technologies as per ASTM standards. These include:

- Material Extrusion (e.g., FDM)
- Powder Bed Fusion
- Vat Photopolymerization (e.g., SLA)
- Material Jetting
- Sheet Lamination
- Directed Energy Deposition
- Binder Jetting

Each process differs in material usage and deposition mechanism. This classification helps researchers and industries choose appropriate techniques based on application requirements.

3. Overview of Major AM Technologies

Dr. Kumar provided detailed explanations of several key additive manufacturing technologies:

- Stereolithography (SLA): Uses UV laser to cure liquid resin with high precision.
- Selective Laser Sintering (SLS): Employs laser to fuse powdered materials.
- Fused Deposition Modelling (FDM): Involves extrusion of thermoplastic materials.
- Laminated Object Manufacturing (LOM): Uses layered sheets bonded together.
- Laser Engineered Net Shaping (LENS): Enables metal deposition using laser energy.

The *diagram* of the provided material illustrates the classification of rapid prototyping technologies into liquid, solid, and powder-based systems, giving a clear visual understanding of these processes.

4. Advances in Metal Printing and Bioprinting

A significant portion of the lecture focused on advanced applications such as:

- Direct Metal Laser Sintering (DMLS): Enables production of dense metallic components.
- 3D Bioprinting: Allows fabrication of biological structures using living cells and biomaterials.

Dr. Kumar emphasized the importance of bioprinting in tissue engineering, regenerative medicine, and artificial organ development, marking it as a breakthrough in interdisciplinary research.

5. Applications of Additive Manufacturing

The speaker highlighted the widespread applications of AM in both engineering and non-engineering domains:

Engineering Applications:

- Prototype development and testing
- Tooling and casting patterns
- Design validation and manufacturability studies

Non-Engineering Applications:

- Biomedical models for surgical planning
- Prosthetics and implants
- Architectural models
- Artistic and sculptural creations

The *images on* demonstrate biomedical applications such as skull and anatomical models derived from CT/MRI data, showcasing the real-world impact of AM in healthcare.

6. Limitations of Additive Manufacturing

Despite its advantages, Dr. Kumar discussed several challenges:

- Poor surface finish due to the staircase effect
- Limited mechanical strength in some cases
- Accuracy constraints
- Material limitations

However, he noted that ongoing research is addressing these issues and improving the performance of AM technologies.

7. Future Research Directions

Dr. Kumar outlined important research areas for the advancement of additive manufacturing:

- Development of advanced hardware systems
- Improved software and simulation tools
- New materials with enhanced properties
- Process optimization for efficiency

These advancements aim to enable direct production of functional parts with properties comparable to conventional manufacturing methods.

8. Emerging Concepts: 4D, 5D, and 6D Printing

4D Printing

Dr. Kumar introduced 4D printing, where time is added as a dimension. Objects can change shape or properties in response to stimuli such as heat, moisture, or light. Concepts like self-assembly and programmable matter were discussed, with potential applications in smart infrastructure and biomedical devices.

5D Printing

He explained that 5D printing uses multi-axis movement, allowing curved layer deposition. This results in:

- Stronger components (3–5 times stronger than 3D printed parts)
- Reduced material wastage
- Improved structural integrity

6D Printing

Finally, 6D printing was presented as the future of manufacturing, combining:

- Multi-axis fabrication (5D)
- Smart materials and adaptability (4D)

Such structures can respond to environmental stimuli and even adapt based on predictive modelling, representing intelligent and dynamic manufacturing systems.

Interactive Session

The lecture was followed by an engaging interactive session where participants actively asked questions related to:

- Differences between 3D, 4D, and 5D printing

- Practical challenges in implementing AM technologies
- Scope of AM in rural and industrial development
- Practical challenges in implementing medical industry

Dr. Kumar addressed all queries with clarity, providing real-world examples and practical insights.

Concluding Remarks

The event concluded with a vote of thanks delivered by Dr. Bikash Panja, Professor and Dean, Engineering and Technology, who expressed sincere gratitude to Dr. Kaushik Kumar for delivering such an enlightening session. The lecture was highly appreciated for its depth, clarity, and relevance to modern engineering practices.

Glimpses for Lecture Session:

Impact and Takeaways

The lecture proved to be highly beneficial, especially for students and research scholars. Key takeaways include:

- Understanding the evolution of manufacturing from 2D to 6D
- Knowledge of modern AM technologies and their applications
- Awareness of future trends like smart and adaptive manufacturing
- Insight into research opportunities in additive manufacturing

Overall, the session was a great success and reinforced the importance of additive manufacturing as a **transformative technology shaping the future of engineering and industry**.k2kk3k

Dr. Bikash Panja
Joint Co-ordinator
Monthly Faculty Lecture Series, SVU

Prof. (Dr.) Ranjan Chakrabarti,
Director, Research & Academic Development, SVU

Dr. Liton Mallick
Joint Co-ordinator
Monthly Faculty Lecture Series, SVU

Date: 20th March, 2026

To

Dr. Kaushik Kumar
Professor,
Department of Mechanical Engineering
Birla Institute of Technology, Mesra, Ranchi - 835215

Subject: **SVU Faculty Lecture Series March 2026, Invitation regarding**

Dear Professor Kumar,

Greetings from SVU!

At the outset let us acknowledge your research contribution in the field of Engineering & Technology.

Swami Vivekananda University, Barrackpore, West Bengal, regularly organizes a monthly Faculty Lecture and it is delivered by distinguish scholars like you.

In this context, I am pleased to invite you to deliver the upcoming Faculty Lecture of the University on **27th of March 2026** (Title: **Additive Manufacturing: Journey from 2D to 6D and beyond**). Your expertise and insights will greatly enrich the program, and your presence will inspire our faculty and research scholars.

The University will be happy to take care of your local transportation and hospitality.

For any further clarification, please feel free to contact the undersigned.

Best regards.

Sincerely

R. Chakrabarti.

Professor Ranjan Chakrabarti,
Director Research and Academic Development, Swami Vivekananda University
Hony. Visiting Professor, Jadavpur University
Former Vice Chancellor of Vidyasagar University and Netaji Subhas Open University (WB)

Received

Gmail

Bikash Panja <bikashp@svu.ac.in>

Invitation- Distinguished SVU Faculty Lecture Series

2 messages

Director, Research & Development <director.research@svu.ac.in> Fri, Mar 20, 2026 at 6:28 PM
To: kkumar@bitmesra.ac.in
Cc: Bikash Panja <bikashp@svu.ac.in>, "Dr.Liton Mallick" <litonm@svu.ac.in>

Professor Kaushik Kumar

Birla Institute of Technology

Dear Esteemed Professor Kaushik Kumar

Greetings from Swami Vivekananda University!

You are aware that Swami Vivekananda University, Barrackpore, West Bengal, organizes a Faculty Lecture as a part of the Faculty Lecture Series, every month. This prestigious Lecture Series was officially inaugurated by the Vice-Chancellor of our University in November 2024.

It is my great pleasure to invite you, on behalf of the entire University community, to deliver the **Distinguished Faculty Lecture** on "Additive Manufacturing : Journey from 2D to 6D and Beyond" **on March 27 , 2026 at 1.45 pm** at our campus.

Your expertise and insights will be invaluable in enriching the program, and your talk will be a source of great inspiration for our faculty members and research scholars.

We would greatly appreciate a line of confirmation at your earliest convenience. You are also requested to send us your short CV at your earliest convenience.

For any further information or clarification, please feel free to contact me or **Dr. Liton Mallik** at **Mobile No. 7003185671**.

With best regards,

Sincerely

Professor Ranjan Chakrabarti,
Director Research and Academic Development, Swami Vivekananda University
Hony. Visiting Professor, Jadavpur University
Former Vice Chancellor of Vidyasagar University and Netaji Subhas Open University (WB)

Fulbright Scholar, Brown University 1994-95
Charles Wallace Fellow,London University 1997
Alexander O'Vietor Memorial Fellow, Brown University 2004

Director, Research & Development <director.research@svu.ac.in> Sat, Mar 21, 2026 at 9:39 AM
To: Bikash Panja <bikashp@svu.ac.in>

---------- Forwarded message ---------
From: **K Kumar** <kkumar@bitmesra.ac.in>
Date: Fri, 20 Mar 2026, 19:48
Subject: Re: Invitation- Distinguished SVU Faculty Lecture Series
To: Director, Research & Development <director.research@svu.ac.in>

Respected Sir,

Greetings of the day!

It is a matter of honour to be at your esteemed university. I accept your invitation and would be available well before the scheduled time.

As requested please find attached my brief biosketch for your kind perusal and necessary processing.

Thank you once again for the kind invitation.

Have a great day and weekend ahead
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With Regards
KAUSHIK KUMAR, Ph.D./ कौशिक कुमार, पीएच.डी.
Professor/प्राध्यापक
Department of Mechanical Engineering/ यान्त्रिक अभियांत्रिकी विभाग
Birla Institute of Technology, Mesra | बिरला प्रौद्योगिकी संस्थान, मेसरा
Ranchi - 835215 (Jharkhand) | राँची - ८३५ २१५ (झारखण्ड)
Contact: 09431597463/ संपर्क: ०९४३१५९७४६३
Alternative E mail: kaushik.bit@gmail.com
Profile: https://www.bitmesra.ac.in/Display_My_Profile_00983KKj893L?id=w5TPklje1olswS64%252bX%252bjdA%253d%253d
SCOPUS Author: http://www.scopus.com/authid/detail.url?authorId=8972729400
ResearchID: https://www.webofscience.com/wos/author/record/48208284
ORCID:http://orcid.org/0000-0002-4237-2836
Google Scholar: https://scholar.google.com/citations?user=WOu-PTQAAAAJ&hl=en&oi=sra
Vidwan: https://vidwan.inflibnet.ac.in/profile/413248

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2 attachments

Kaushik Kumar Brief Bio-Sketch.docx
31K

Kaushik Kumar Bio-Sketch.docx
32K

Gmail

Bikash Panja <bikashp@svu.ac.in>

Faculty Lecture - Invitation

5 messages

Director, Research & Development <director.research@svu.ac.in> Mon, Mar 23, 2026 at 9:55 PM
To: Swami Vivekananda University - Info <info@swamivivekanandauniversity.ac.in>, Subrata Dey <vc@swamivivekanandauniversity.ac.in>, Pinak Pani Nath <registrar@swamivivekanandauniversity.ac.in>, Tanmoy Mazumder <deputy.registrar@svu.ac.in>, Director School Of Management <director.som@svu.ac.in>, "Director, Research & Development" <director.research@svu.ac.in>, director.sos@svu.ac.in, Director School of Life Sciences <dir.solc@svu.ac.in>, director.agriculture@svu.ac.in, Shorosimohan Dan <dan.shorosimohan@gmail.com>, Deb Narayan Bandyopadhyay <debnarayanb@svu.ac.in>, Bikash Panja <bikashp@svu.ac.in>, Rajnath Bhat <rnbhat2k2@gmail.com>, "Dr.P.K Acharya" <PareshAcharya1@gmail.com>, Sukumar Mukhopadhyay <mukhopadhyay21@gmail.com>, Office Of the Vice Chancellor <office.vc@svu.ac.in>, officeassistant.coo@svu.ac.in
Bcc: bikashp@svu.ac.in

Dear Esteemed Vice-Chancellor, Esteemed Chief Operating Officer, Directors, Deans, Hods and colleagues

Greetings !

Swami Vivekananda University, Barrackpore, West Bengal, regularly organizes a monthly Faculty Lecture Series and it is delivered by a distinguish scholar from within SVU or outside. This Lecture Series was initiated with the active support and encouragement of our Esteemed COO and the Series was officially inaugurated by our Vice-Chancellor in November 2024.

In this context, I am pleased to invite you to kindly make it convenient to attend the upcoming Faculty Lecture of the University (16th in the Series) on 27th March, 2026, to be delivered by Professor Kaushik Kumar of Birla Institute of Technology, **at 2.00 pm, in Room No NND 307. The title of his Lecture is 'Additive Manufacturing : Journey from 2D to 6D and Beyond'.**

Please find the poster of this event attached herewith for your kind perusal.

Your graceful presence along with your departmental colleagues shall enrich the program and inspire our faculty and research scholars.

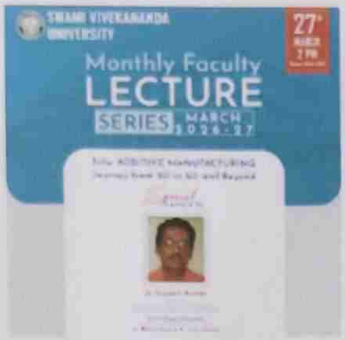
Please make it convenient to attend.

Warm regards

Sincerely

Professor Ranjan Chakrabarti,
Director Research and Academic Development, Swami Vivekananda University
Hony. Visiting Professor, Jadavpur University
Former Vice Chancellor of Vidyasagar University and Netaji Subhas Open University (WB)

Fulbright Scholar, Brown University 1994-95
Charles Wallace Fellow,London University 1997
Alexander O'Vietor Memorial Fellow, Brown University 2004



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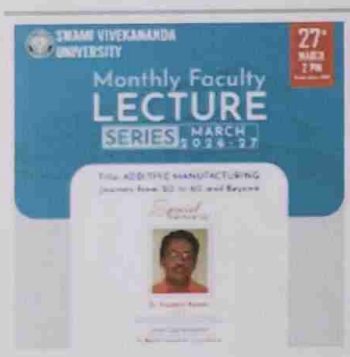
452K

Director, Research & Development <director.research@svu.ac.in> Mon, Mar 23, 2026 at 9:57 PM
To: Bikash Panja <bikashp@svu.ac.in>

Dear Professor Panja

Kindly circulate to all Hods and Faculty Members.

Regards
[Quoted text hidden]



IMG-20260323-WA0006.jpg
452K

Bikash Panja <bikashp@svu.ac.in> Fri, Mar 27, 2026 at 2:34 AM
To: sushmitag@svu.ac.in, Ranjan Kumar <ranjank@svu.ac.in>, "Dr. Sudip Das" <sudipdas1380@gmail.com>, digantab@svu.ac.in, ranjankm@svu.ac.in, subhabratab@svu.ac.in, tanmoys@svu.ac.in, prithap@svu.ac.in, souravm@svu.ac.in, dipanwitag@svu.ac.in, manisham@svu.ac.in, nilanjanam@svu.ac.in, olyb@svu.ac.in, subhranilm@svu.ac.in, rituparnac@svu.ac.in, pramitir@svu.ac.in, litonm@svu.ac.in, anirbanh@svu.ac.in, kallalb@svu.ac.in, debanjalia@svu.ac.in, subratan@svu.ac.in, najnin.islam92@gmail.com, kazi hasibur rahman <via.kazi786@gmail.com>, sudips@svu.ac.in, srijanh@svu.ac.in, subhasiss@svu.ac.in, arups@svu.ac.in, moumitad@svu.ac.in, papiam@svu.ac.in, rajend@svu.ac.in, shubhamb@svu.ac.in, moumitac@svu.ac.in, Amitava Bhowmick <amitavabmce@gmail.com>, shantanuc@svu.ac.in, neelanjanm@svu.ac.in, arunimam@svu.ac.in, lamiyas@svu.ac.in, goutamb@svu.ac.in
Cc: director.research@svu.ac.in, deputy.registrar@svu.ac.in, sourav@svu.ac.in, abhishek.dhar@svu.ac.in

Dear all HODs and Research Coordinators

Please find the invitation to the upcoming said program and circulate among our faculty members, research scholars and students. We encourage your participation and look forward to your valuable presence.

The session has been rescheduled to 12:00 noon in Room No. NND 307.

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Thanks & Regards.

Monthly Faculty Lecture Series

Swami Vivekananda University

Barrackpore - Barasat Rd, Sewli Telinipara, Malir Math,

Bara Kanthalia, West Bengal 700121

March – 2026

27/03/2026

SL No.	Name	Department	signature
1	Dipak Sarkar	Mechanical Engg.	Dipak Sarkar
2	Joydip Roy	M.E	Roy
3	Sourav Giri	M.E	Sourav Giri
4.	Mrinal Kumar Das	M.E	M.K. Das
5.	Pritwish Dey	M.E	Pritwish Dey
6.	Rudra Masanta	M.E	Rudra Masanta
7.	Nitai Patra	M.E	Nitai Patra
8.	Budhadev Khadua	ME	Budhadev Khadua
9.	Sankar Jana	ME	Sankar Jana
10.	Rabindranath Das	ME.	Rabindranath Das
11.	Sreemoye Dey	M.E	Sreemoye Dey
12.	Koushis Santra	M.E	Koushis Santra.
13.	Prince Mondal	M.E.	Prince Mondal
14.	Ajanava Dash Shaema	M.E	Ajanava Dash Shaema
15.	Ajit Singh	M.E	Ajit Singh
16.	SOURIK SARDAR	M.E	Sourik Sardar

Monthly Faculty Lecture Series

Swami Vivekananda University

Barrackpore - Barasat Rd, Sewli Telinipara, Malir Math,

Bara Kanthalia, West Bengal 700121

March – 2026

27/03/2026

SL No.	Name	Department	signature
1	RISHOV CHAKRABORTY	C.S.E	
2	TRIDIB MAZUMDAR	CSE	
3.	Nitai Das	CSE	
4.	Dipanjan Das	CSE	
5.	Tulika Paul	CSE	
6.	UDDIPTA MODAK	CSE	
7.	Pradip Saha	CSE	
8.	Sagar Das	CSE	
9.	Souvik Biswas.	CSE	
10.	Samrat Sahana	CSE	
11	Sourashis Chakraborty	CSE	
12	Amit Ghosh	CSE	
13	Bishal Ray.	CSE	
14.	Moumita Mandal	CSE	
15.	Jayeeta Nath	CSE	
16	Dharmendu Sanjan	ME	

Monthly Faculty Lecture Series

Swami Vivekananda University

Barrackpore - Barasat Rd, Sewli Telinipara, Malir Math,

Bara Kanthalia, West Bengal 700121

March – 2026

27/03/2026

SL No.	Name	Department	signature
01	Dr. Sudip Das.	EE	
02	Abir Das	EE	
03	Swati Dey	EE	
04	Sahanur Reja Parvej	EE	
05.	Md Sahil Ahammed	EE	
06.	Abhinaba Gupta	MLT	
07	Wasim Firoz Molla	MLT	
08.	Bikram Dhali	BAOTT	
09.	Soumadip Sur.	BMLT	
10.	Ratul Pramanick	ME	Ratul Pramanick
11.	Pramit Kumar Saha	EE	
12.	Avishek Samanta	ME	
13.	Tanushree Barman	ME	TiB
14.	Jishunarayan Eshore	M.E	
15.	Pradip Kumar Das	M.E.	
16	Subhranil Das	ECE 4th sem	Subhranil Das

Monthly Faculty Lecture Series

Swami Vivekananda University

Barrackpore - Barasat Rd, Sewli Telinipara, Malir Math,

Bara Kanthalia, West Bengal 700121

March – 2026

27/03/2026

SL No.	Name	Department	signature
1.	Subhajit Saltate	DEE	S.saltate
2.	Sujit Das	DEE	Sujit Das
3.	Rudra Prasad Bhunia	DEE	
4	PRANAB KUMAR BARIK	ECE	Pranab kumar Barik
5	Narayan Shit	ECE	Narayan Shit
6.	Sumar Mondal.	ECE	Sumar Mondal.
7.	RANJAN CHAKRABARTI	Res & Dev.	R. Chakraborty.
8.	Anuradha Mukhopadhyay	School of Science	Mukhopadhyay
9.	Swagata Dey.	CSE	Dey 27/3/26