SRM INSTITUTE OF SCIENCE & TECHNOLOGY
(Deemed to be University u/s 3 of UGC Act, 1956)

CINTELASSOCIATION

DEPARTMENT OF CINTEL
Software that can think

School of Computing

COLOSSAL

January 2025
VOLUME 4
ISSUE 3

EDITOR'S VOICE

B.AMUTHA

DR.C.ARUN

DR. B. HARIHARAN

DR. GOPIRAJAN PV

Attention is All you Need- The Dawn of Transformers

Dear Co-Explorers!

A Warm meeting with all of you in the first quarter of 2025! Our success story continues along with hurdles on and off the way on our paths!!!

The Birth of the Transformer:

The Transformer is a neural network architecture that was introduced in the seminal paper "Attention Is All You Need" by Vaswani et al. in 2017. The paper presented a novel sequence-to-sequence architecture for natural language processing that replaced the traditional recurrent neural networks (RNNs) with a self-attention mechanism. This mechanism allowed the model to focus on different parts of the input sequence when generating the output, leading to significant improvements in performance.

The Transformer was a major breakthrough in the field of natural language processing, and has since become one of the most widely used architectures for tasks such as language translation, language modeling, and question answering. However, the Transformer's impact extends beyond natural language processing, and it has also been applied to tasks such as image generation and speech recognition.

EDITOR'S VOICE

The idea of self-attention was not entirely new when the Transformer was introduced. Previous work had explored the use of attention mechanisms in neural networks, such as the neural Turing machine and the memory network. However, the Transformer was the first architecture to use self-attention exclusively, and it was able to achieve state-of-the-art results on several natural language processing tasks.

The self-attention mechanism in the Transformer works by computing a weighted sum of the input sequence, where the weights are determined by the similarity between each input element and a query vector. The query vector is computed from the decoder's hidden state, allowing the model to selectively attend to different parts of the input sequence depending on the context.

One of the key advantages of the Transformer is its ability to capture long-range dependencies in a sequence, which is a significant challenge for RNN-based architectures. The self-attention mechanism allows the Transformer to model complex relationships between different parts of the input sequence, leading to more accurate and coherent predictions.

Since its introduction, the Transformer has undergone several modifications and extensions. Variants such as the BERT model and the GPT series have further improved upon the original architecture, and have demonstrated impressive performance on a wide range of natural language processing tasks.

In summary, the birth of the Transformer represented a major breakthrough in the field of natural language processing, and has had a significant impact on other fields such as image generation and speech recognition. Its ability to capture long-range dependencies in a sequence has made it a powerful tool for modeling complex relationships in data, and its continued development is likely to lead to further breakthroughs in the future. Hope surely you start using ChatGPT, CoPilot, Gemini, Claude, Mistral, Perplexity AI, etc...

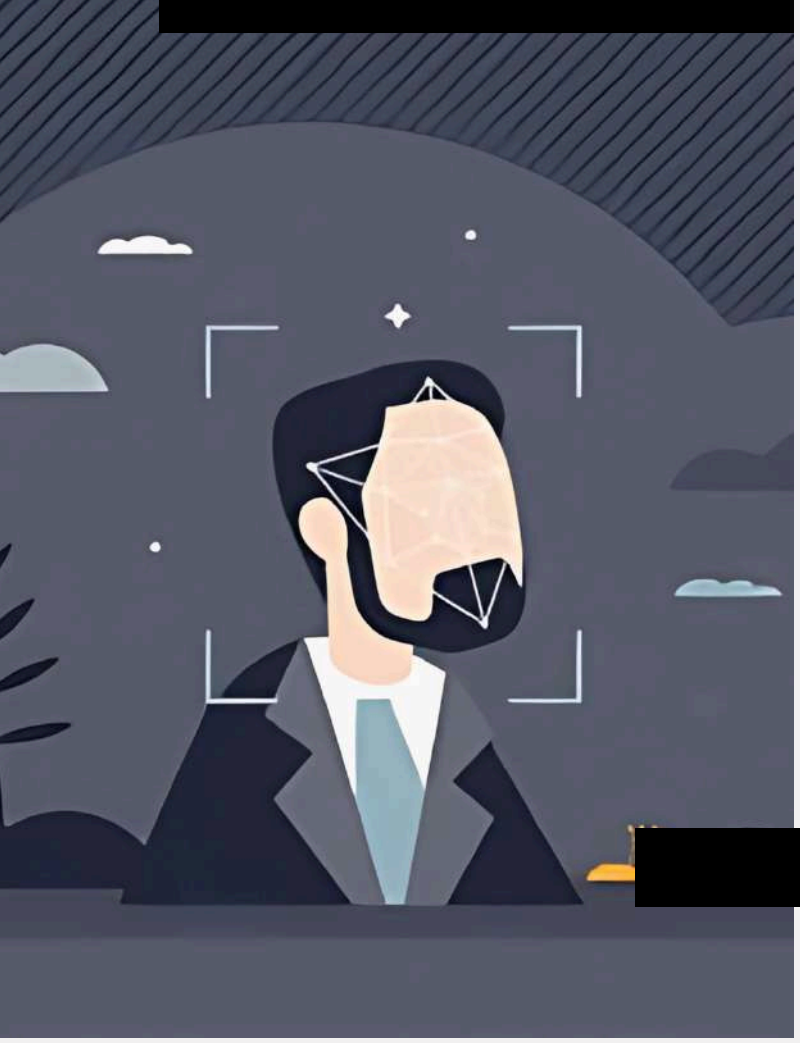
The Department of Computational Intelligence works on data, synthetic data and with Gen-AI Powered computing principles. The intention of bringing research in the Department not only notices the requirements of the industries rather analyzing the solutions to eradicate the difficulties of common people in a more technological way by solving complex problems. It works upon the actual data along with the synthetic data generated so as to develop it's own power transformer with the knowledge of AI, GENAI, DIGITAL Twin, NLP, AI/ML/DL, in the untouched arena of Low Stakes AI.

You can ask any question to our Tiny language Model Transformer! You will get fascinating Answers!!

I am sure, Colossal will really make your eyes not blink! Stay Tuned for the next edition!!

"They Succeed, because they think they can." -Proverb

B.Amutha
SCO-Newsletter Head



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A GLIMPSE INTO WHAT IS IN STORE FOR YOU THIS EDITION

Read More ...

DST-FIST

Learning Unlimited **Pioneering Immersive Education**

WITH DST-FIST SUPPORT

BENIFITS

Enhanced Engagement and Immersive Learning:

Personalized and Flexible Learning:

Access to Advanced Educational Resources:

TECH ENLIGHTENS!

The Department of Computational Intelligence at the School of Computing has achieved a significant milestone, securing a ₹72 Lakhs grant under the DST-FIST program for their innovative project, "Learning Unlimited: A Master-Client Studio Platform for Immersive Learning via Humanoid Teacher and Mixed Reality." This Level-B recommendation from the Department of Science and Technology underscores the project's potential to revolutionize education through cutting-edge technology. Led by Principal Investigator Dr. R. Annie Uthra and a dedicated team of Co-PIs including Dr. Saad Sait, Dr. Athira Nambiar, Dr. Anupama, Dr. Jackulin, Dr. Beaulah, Dr. Jayakanth, Dr. Sherin, Dr. Arunarani, Dr. Sumathi, Dr. Sudha Rajesh, and Dr. A. Maheshwari., the project aims to develop a sophisticated platform that leverages humanoid teachers and mixed reality to create engaging and accessible learning experiences. This substantial funding will enable the team to advance their research and development, paving the way for transformative advancements in immersive learning.

THE HINDU AI SUMMIT 2024

The Hindu AI Summit 2024

SRMIST is proud to announce that Prof. Annie Uthra, Head of the Department of Computational Intelligence, participated as a panelist at the AI Summit 2024, hosted by The Hindu. In the session “Transition from Hope to Reality: Navigating AI Challenges,” she shared valuable insights on AI adoption challenges and the transformative potential of computational intelligence in real-world applications.

Prof. Revathi Venkataraman , Chairperson, School of Computing, participated in an insightful discussion on “Empowering Students in the Age of AI: Skills for Tomorrow’s Innovators,” emphasizing the importance of preparing future leaders for the AI-driven era.

Prof. ANNIE UTHRA R, HoD, Computational Intelligence,shared transformative insights as a panelist in the session “Transition from Hope to Reality: Navigating AI Challenges,” exploring AI adoption challenges and its real-world impact.

Prof. Kavitha Venkatachalam , HoD, Data Science & Business Systems,contributed to the panel on “Ethical Considerations in AI: Navigating The Moral Landscape,” addressing the ethical challenges of AI and its influence on startup policies.

These outstanding contributions highlight SRMIST’s leadership in AI innovation and ethical practices, paving the way for a brighter technological future.

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DR. SAGEENGRANA S

DR. N. GOPINATH

DR. M. MEENAKSHI

WELCOME TO THE CINTEL FAMILY

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DR. MOHAMMAD ISHTIYAQ QURESHI

DR. K. LAKSHMI NARAYANAN

DR.SHANMUGAM K

WELCOME TO THE CINTEL FAMILY

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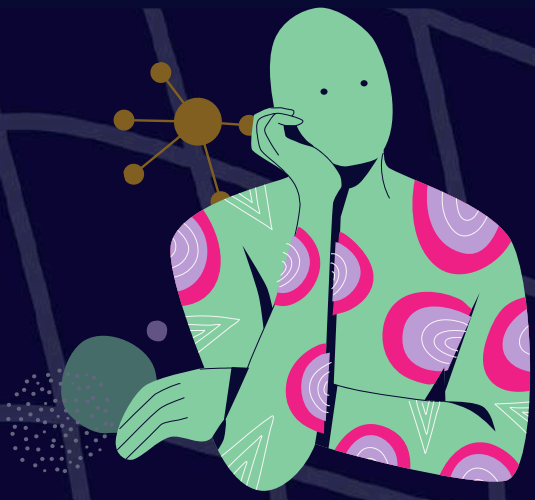
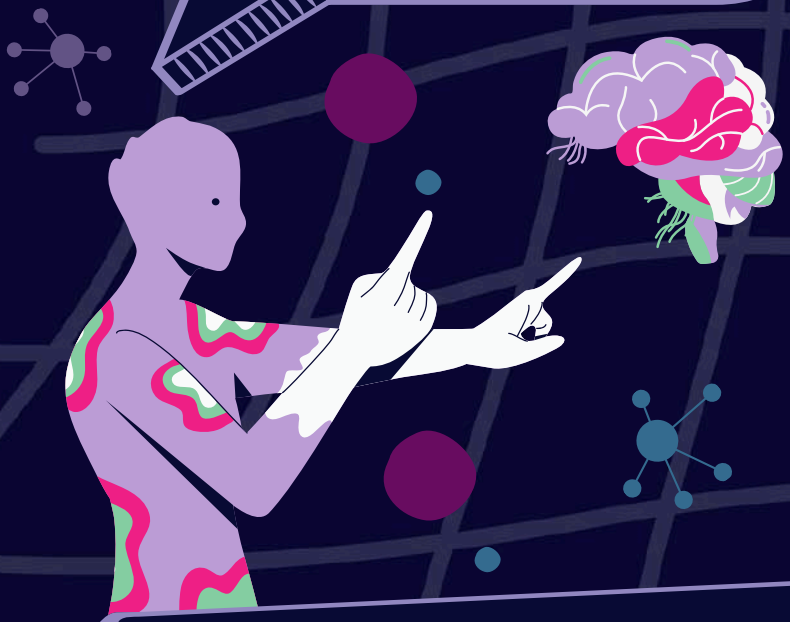
DEEPFAKE DIARIES

Addictive substances can also be measured in numbers. Discover key statistics about their global and local impact.



Global depression

Over 264 million people suffer from depression, often linked to substance abuse. This highlights the connection between mental health and the use of addictive substances.

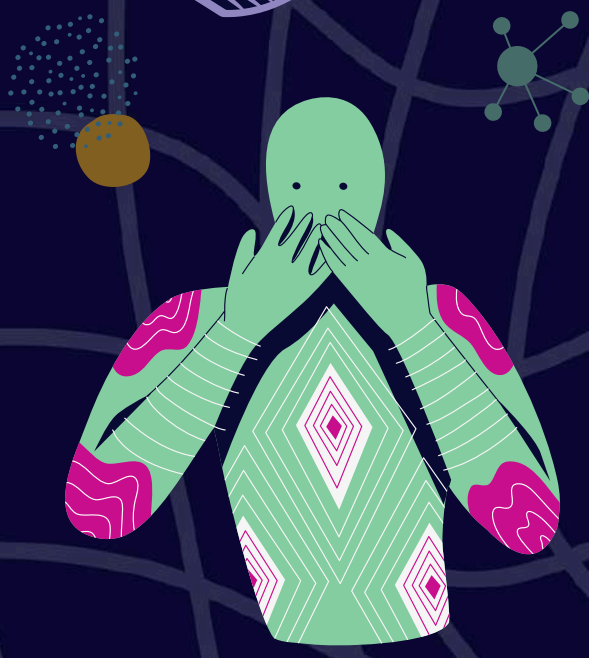


Hospital admissions

Each year, millions of people are hospitalized due to complications related to substance abuse. These admissions place a significant strain on healthcare systems.

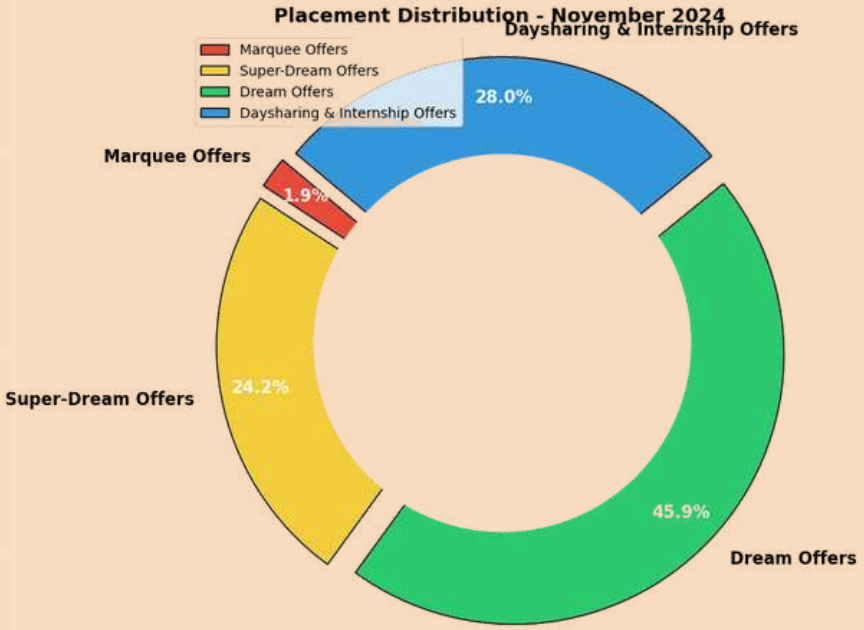
Economic cost

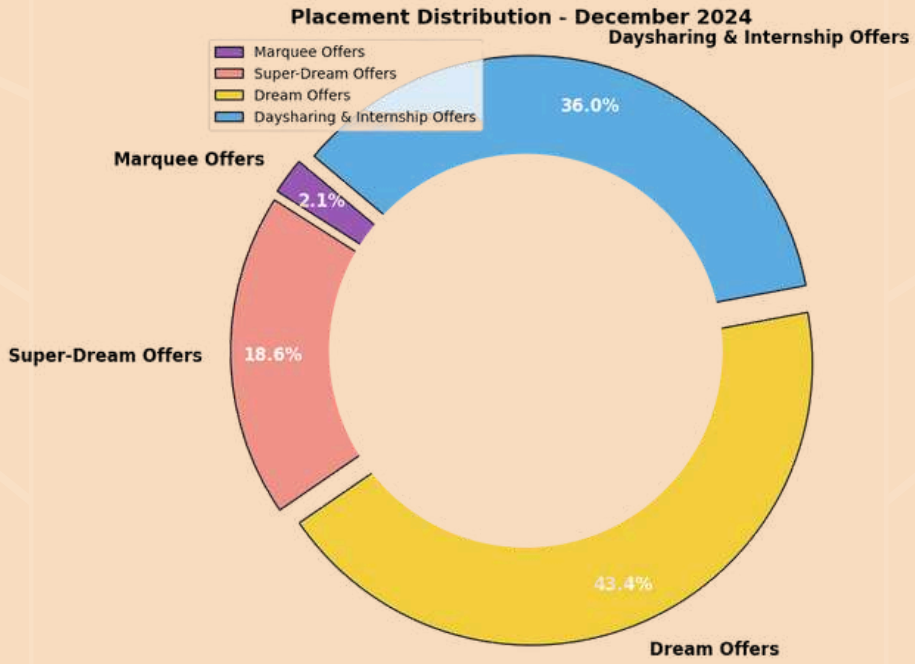
Globally, the costs related to substance abuse amount to trillions of dollars each year. These expenses include healthcare, lost productivity, and law enforcement efforts, placing a heavy burden on economies worldwide.



CINTEL PLACEMENTS

The Computational Intelligence department has achieved a remarkable placement record, with students securing coveted positions in leading companies across various sectors. In November, an impressive 63% of students were placed, followed by a significant 27% in December. This success is a testament to Cintel's commitment to providing students with the skills and knowledge necessary to excel in today's competitive job market.



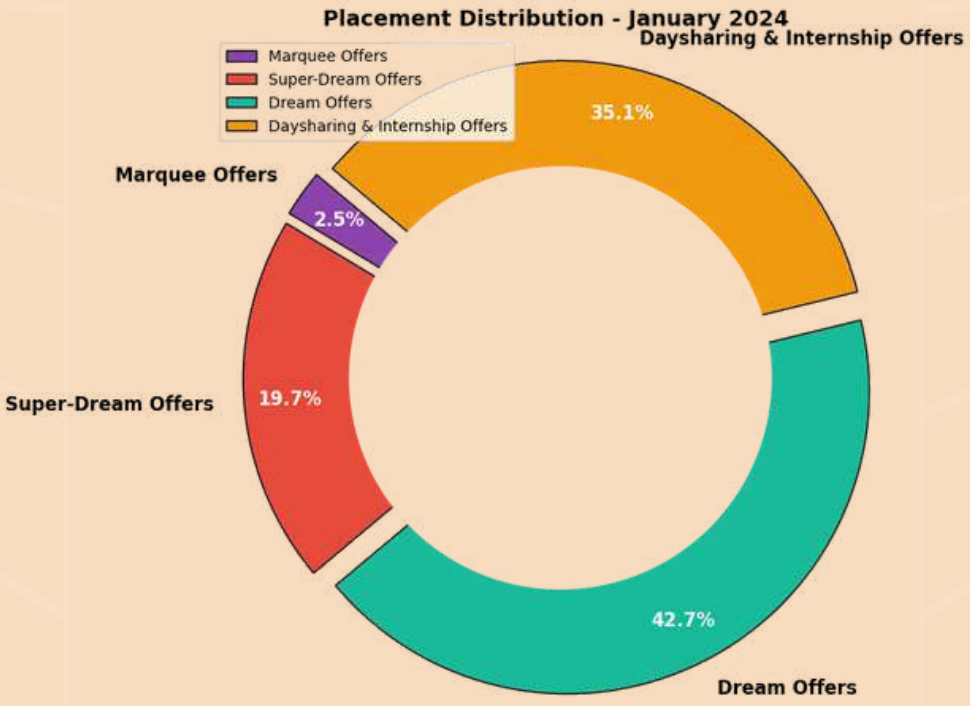


CINTEL

PLACEMENTS

The department's emphasis on hands-on experience, industry-relevant curriculum, and strong partnerships with leading organizations has enabled students to seamlessly transition from academia to the professional world. By January, an outstanding 10% of students had secured placements. These impressive statistics reflect not only the dedication of the faculty and staff but also the hard work and talent of Cintel's exceptional students.

Cintel's continued success in placing its graduates in top companies is a source of pride for the department and the university as a whole. It underscores the value of a Cintel education and reinforces the department's position as a leading hub for computational intelligence education and research.

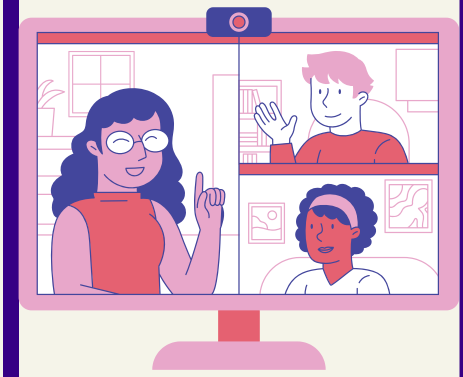


STUDENT ACHIEVEMENT

- Div Jot Singh Manchanda, a third-year (VI semester) student with registration number RA2211047010131, pursued studies in Artificial Intelligence (AI) at the University of California, San Francisco, US, under the KTR program.

Sreekesh S, a first-year student with registration number RA2411026011286, won the Certificate of Merit - First Prize in TECHKNOW 2024-2025 organized by SRMIST

Vibhas, a first-year student with registration number RA2411026010072, received the Certificate of Appreciation - Second Place in Creative Ingenuity '24 conducted by SRMIST.



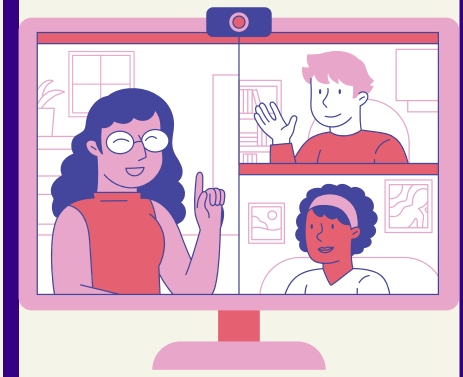
Syon Mukherjee, a second-year student with registration number RA2311026010701, secured the 3rd Prize in the event Back to Cubing hosted by MCC.

STUDENT ACHIEVEMENT

- Arnav Madan, a third-year student with registration number RA2211033010088, secured the Second Prize in the Barclays - Student Innovation Showcase hosted by Barclays.
- Sanya Singh, a second-year student with registration number RA2211033010094, participated in the Badminton event held at Loyola Chennai.
- Ananya Mahajan, a first-year student with registration number RA2311047010083, took part in the event "Shuru" organized by SRMIST, KTR.

Yukta Bhardwaj, with registration number RA2311026010211, also participated in another session of the event "SLA-Capacity Building for Sustainable Education" conducted by SRMIST, KTR.

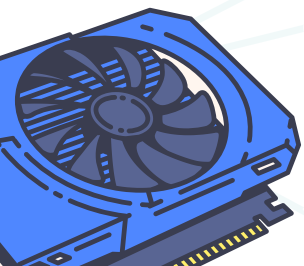
P. Nikhila Varma, a first-year student with registration number RA2311026010666, took part in the "SRMIST TV Advertisement Shooting" event organized by SRMIST, KTR.



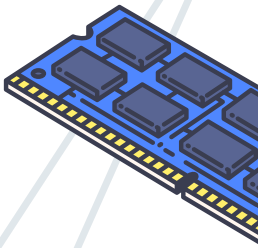
Yukta Bhardwaj, a first-year student with registration number RA2311026010211, participated in the event "SLA-Capacity Building for Sustainable Education" hosted by SRMIST, KTR.

The Evolution of Neural Radiance Fields (NeRF) in Synthetic Media Production

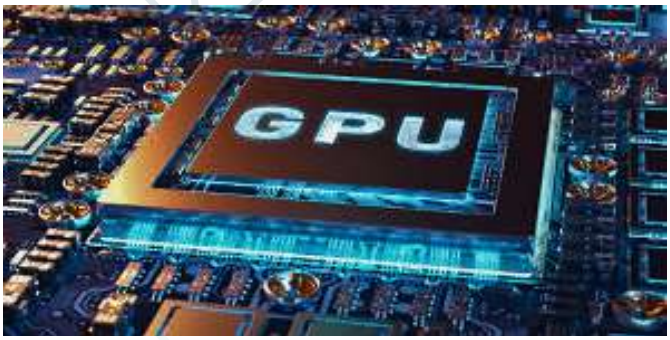
The trajectory of Neural Radiance Fields (NeRF) has fundamentally transformed 3D scene representation, evolving from its 2020 introduction as a novel technique for synthesizing novel viewpoints into a cornerstone technology that now underpins advanced synthetic media production across film, gaming, and virtual reality. At its mathematical core, NeRF implements a continuous volumetric function $F(x,d,\theta)$ that maps 5D coordinates—spatial position (x) and viewing direction (d)—to output color (RGB) and density values through a multi-layer perceptron optimized via photometric reconstruction loss, effectively learning a neural implicit representation that captures complex scene properties including view-dependent lighting effects and semitransparent surfaces that traditional 3D representations struggled to model.



The original NeRF architecture faced significant limitations: prohibitively slow training times (days for a single scene), lengthy rendering processes (seconds per frame), and requirements for dense, calibrated multi-view imagery—constraints that inspired a cascade of innovations including Instant NGP's multiresolution hash encoding that accelerated training by factors of 1000×, Mip-NeRF 360's integrated regularization techniques for handling unbounded scenes with sparse views, and Nerfacto's hybrid reconstruction approach combining neural volumetric rendering with traditional computer graphics primitives.

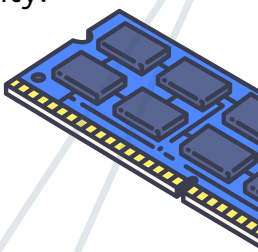


Recent advances have extended NeRF beyond static scenes through Dynamic NeRF architectures that decompose time-varying scenes into canonical space representations with learned deformation fields, enabling applications in performance capture and digital human



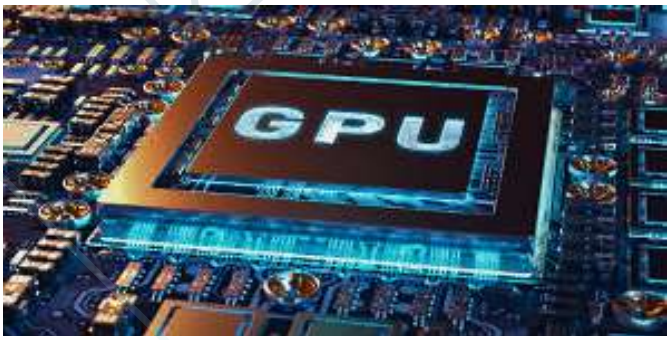
The Evolution of Neural Radiance Fields (NeRF) in Synthetic Media Production

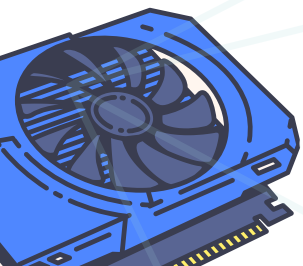
This rapid evolution signifies a fundamental shift in synthetic media production—from traditional handcrafted 3D modeling toward neural representations that capture real-world complexity directly from images, promising a future where photorealistic virtual environments can be created with unprecedented ease and fidelity.



creation, while text-conditioned NeRF models leverage the semantic understanding of large language models to generate complete 3D scenes from textual descriptions—bridging the gap between natural language understanding and 3D content creation.

The computational efficiency frontier continues advancing through techniques like texture-space rendering (shifting computations from volume rendering to texture mapping), neural proxy geometries (using mesh-based approximations guided by volumetric neural networks), and adaptive sampling strategies that concentrate computational resources on visually significant regions of space—developments that collectively enable real-time NeRF rendering on consumer hardware and integration with established 3D content pipelines.





FACULTY ACHIEVEMENT

Cintel's faculty at SRMIST consistently drive innovation through impactful research and global presentations, solidifying their position as leaders in computational intelligence. Their dedication to advancing technology enriches both the academic community and the wider field.

DR. R. ANNIE UTHRA AND DR. B. HARIHARAN

Dr. R. Annie Uthra and Dr. B. Hariharan represented their university as keynote speakers at ISNST in Taiwan. Dr. Uthra discussed "Digital Twin" technology, while Dr. Hariharan focused on "Generative AI." Their presentations highlighted the university's commitment to global collaboration and technological advancement.

DR. VINSTON RAJA R

SRM Institute of Science and Technology's III AI C received the "Catalysts of Change" award from Chennai Volunteers on February 25th at Church Park, recognizing their outstanding contributions to community through impactful student volunteering.

FACULTY ACHIEVEMENT

Cintel's faculty at SRMIST consistently drive innovation through impactful research and global presentations, solidifying their position as leaders in computational intelligence. Their dedication to advancing technology enriches both the academic community and the wider field.

MR. KAVIYARAJ R

An interactive maze animation simplifies complex AI search algorithms by visualizing uninformed and informed strategies. This hands-on approach transforms abstract concepts into a tangible experience, enhancing learning through clear visualization and promoting technical excellence.

J.PAVITHRA

J. Pavithra, guided by Dr. Selvakumara Samy (Cintel, SRMIST), completed research on "Optimized Android Malware Detection." The project enhanced malware detection using feature selection and ranking for improved performance.

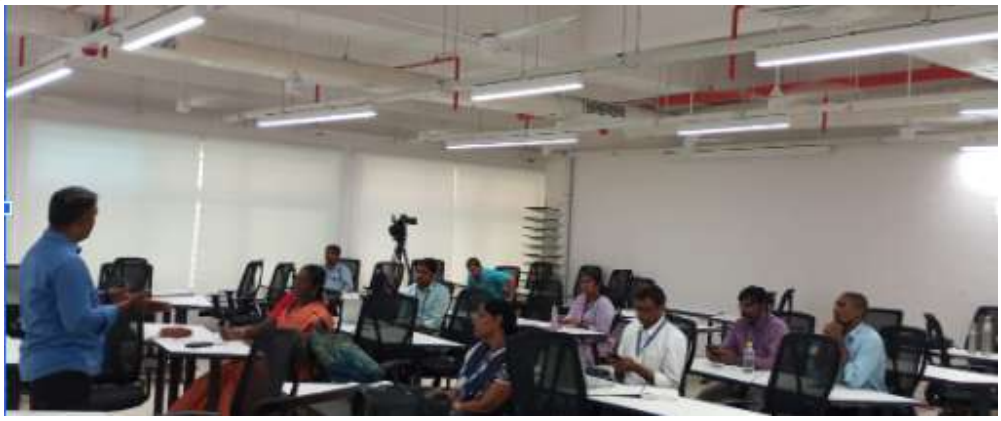
FACULTY ACHIEVEMENT

Cintel's faculty at SRMIST consistently drive innovation through impactful research and global presentations, solidifying their position as leaders in computational intelligence. Their dedication to advancing technology enriches both the academic community and the wider field.

MS. INDUMATHI.V

Inview of Encouraging the innovative teaching pedagogy, Chair Person School of Computing has appreciated Ms. V.Indumathi for her innovative pedagogy practice -Collaborative Code Clinic (CCC) -After preparation, each team presented their logic and pseudocode to the entire class. This was followed by an interactive peer-review session, where other teams provided constructive feedback and suggestions to optimize the proposed solutions and improve algorithmic efficiency.

FACULTY UPSKILLING



- The Faculty Development Program (FDP) on the Foundations of Artificial Intelligence was conducted from December 2, 2024, to December 7, 2024. The program enhanced faculty knowledge of AI fundamentals, machine learning, deep learning, and real-world applications through expert lectures and hands-on sessions. It equipped educators with the skills to integrate AI concepts into academics and research.
- Dr. S.P. Angelin Claret participated in the event "Recent Trends in Artificial Intelligence and Cloud Technologies Towards Agriculture", conducted by Saveetha University from 18-11-2024 to 23-11-2024.
- Dr. Kanipriya M attended the "Advanced Design Thinking and Innovation in Research and Development" event, organized by Vels Institute of Science, Technology, and Advanced Studies, from 18-11-2024 to 30-11-2024.
- Dr. Kumar Kishore took part in the "4th International Conference on Technological Advances in Computational Sciences", hosted by Amity University, from 13-11-2024 to 15-11-2024.
- Dr. Gowtham Padmanabhan attended an International Conference at IIT Guwahati from December 11, 2024, to December 14, 2024. The event featured keynote sessions, research presentations, and discussions on emerging advancements, providing a platform for academic and industry collaboration.

PUBLICATIONS

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- ·Dr P Geetha's paper on Big data analytics in agriculture: cloud-based architecture for crop disease classification has been published in the International Journal of Ad Hoc and Ubiquitous Computing.
- Dr.J.J.Jayakanth's paper on Secure wireless sensor network transmission using reinforcement learning and homomorphic encryption has been published in the International Journal of Data Science and Analytics.
- T R SARAVANAN'S paper on IoT-Enabled energy conservation in residential Buildings: Machine learning models for analyzing annual solar power consumption has been published .
- Jothi's paper on TwinSec-IDS: An Enhanced Intrusion Detection System in SDN-Digital-Twin-Based Industrial Cyber-Physical Systems has been published in the Concurrency and Computation: Practice and Experience2024.
- Saranya P, paper on ENHANCING MACHINE LEARNING MODEL EFFICIENCY THROUGH MODIFIED LDA FEATURE REDUCTION FOR DISEASE DIAGNOSIS has been published in the Journal of Applied Mathematics and Informatics, DOP.
- Dr. Joseph James S paper on An Improved Sunflower Optimization Algorithm for Cluster Selection With Secured Data Transmission Using Cryptographic Techniques in WSNS – IoT has been published in Yugoslav Journal of Operations Research.
- Dr.J.Jeyasudha's paper on Hybrid Computational Intelligence Models for Robust Pattern Recognition and Data Analysis has been published in International Journal of Computational and Experimental Science and Engineering.
- Dr.M.Uma's paper on Optimization of Thermal and Pressure Drop Performance in Circular Pin Fin Heat Sinks Using the TOPSIS Method has been published in Journal of Energies.
- Dr.Robert Singh A's paper on An Integrated Approach using YOLOv8 and ResNet, SeResNet & Vision Transformer (ViT) Algorithms based on ROI Fracture Prediction in X-ray Images of the Elbow has been published in Journal of Current Medical Imaging.

PUBLICATIONS

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- ·Dr.R.Athilakshmi's paper on Enhancing Blind Source Separation: Leveraging Multi Kernel Methods for Complex Audio Environments has been published in IEEE Students Conference on Engineering and Systems: Interdisciplinary Technologies for Sustainable Future.
- ·T R SARAVANAN'S paper on Reinforcement Learning for Patient-Centric Lighting Management System in Healthcare Sector now has been published in 8TH International Confernence on I-SMAC 2024.
- ·M.Maheswari's paper on Comprehensive Analysis of Arabic Sentiment Analysis using Lexicon and Machine Learning based Approaches has been published in 2nd IEEE International Conference on Networks, Multimedia and Information Technology, NMITCON 2024.
- ·M.Maheswari's paper on A Classification of Face Recognition System Using Faster Region-Based Convolutional Neural Network has been published in 2nd IEEE International Conference on Networks, Multimedia and Information Technology, NMITCON 2024.
- ·Dr.S.Vimal's paper on Enhancing IoT healthcare security with verifiable random ranking-based secure blockchain consensus mechanism has been published in AIP Conference Proceedings.
- · Dr.R.Athilakshmi's paper on patio-Temporal Fusion for Video-Based Human Activity Recognition: A Novel LRCN TDL Approach has been published in 2nd IEEE International Conference on Data Science and Network Security.
- ·Dr.R.BEAULAH JEYAVATHANA'S paper on Sequential Model Using Explainable AI Method to Detect Eye Diseases has been published in International Conference on Deep Sciences for Computing and Communications.
    - Arun,C et al (2024). "Water Quality Analysis Using Machine Learning Techniques", Deep Sciences for Computing and Communications, IconDeepCom 2023. Communications in Computer and Information Science, vol 2176. Springer.
    - Mishra Aditya and Arun Chinnathambi. "Multi-camera person tracking and re-identification system." AIP Conference Proceedings. Vol. 3255. No. 1. AIP Publishing, 2025.

PUBLICATIONS

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- ·Dr. S. Abijah Roseline's paper on Exploring Tree Based Machine Learning for Multi-Illness Prediction has been published in International Conference on Knowledge Engineering and Communication Systems.
- ·Dr. Prince Chelladurai S paper on Revolutionizing Aquaculture Practices: IoT and Deep Learning-based Remote Monitoring for Sustainable Fish Farming has been published in 5th International Conference on Smart Electronics and Communication. (ICOSEC)
- ·Dr. Grace Shalini.T paper on Enhancing Lung Disease Identification with Multimodal Data Fusion and Deep Learning CNN Approach has been published in 5th International Conference on Smart Electronics and Communication (ICOSEC-2024).
- ·Dr. Grace Shalini.T paper on xploring Innovations in Autonomous Robotics and Mechatronics: Application in Manufacturing and Healthcare", 5th International Conference on Smart Electronics and Communication (ICOSEC-2024).
- ·Dr. B Vidhya's paper on Anomaly Event Detection and Classification Using Deep Learning Model and Deep Double Q-learning Network has been published in 2nd IEEE International Conference on Networks, Multimedia and Information Technology, NMITCON 2024.
- ·Dr Amutha AL's paper on Pothole Detection from an Enhanced Aerial Image Using CNN Model is now published in International Conference on Deep Sciences for Computing and Communications.
- ·Dr.B.Hariharan's paper on An Efficient DDOS Attack Detection in Software-Defined Networks Using Enhanced Long Short-Term Memory has been published in IEEE XPLORE.

- Dr.B.Hariharan's paper on Detection of Cracks Using LeNet-5 with Mish Activation with a Comparison to the Performance of Swin Transformers has been published in IEEE XPLORE.
- Dr.M.S.Abirami's paper on Temporal Attention Network for CNNE Model of Variable-length ECG Signals in Early Arrhythmia Detection has been published on Indonesian Journal of Electrical and Computer Science.

PUBLICATIONS

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- ·Dr. Gopirajan PV's paper on AstroFusion: A GAN-Augmented Approach for Exoplanet Detection has been published in IEEE XPLORE.
- ·VIMALADEVI M's paper on enhanced QSVM with elitist non-dominated sorting genetic optimisation algorithm for breast cancer diagnosis has been published in IET Quantum Communication.
- · Dr.B.Hariharan,'s paper on An Analysis on Integrating Advanced Conversational AI in Legal Summarization and Information Retrieval has been published in IEEE XPLORE.
- ·U Sakthi's paper on Optimal Fuzzy Deep Neural Networks-Based Plant Disease Detection and Classification on UAV-Based Remote Sensed Data has been published in IEEE Access.
- ·K Suresh's, V Kavitha's paper on Deep anomaly detection: A linear one-class SVM approach for high-dimensional and large-scale data has been published in Applied Soft Computing.
- ·Dr. Gowtham P paper on Liquefaction and reliquefaction mitigation of sand specimen treated with prefabricated vertical drains: An experimental investigation has been published inGeotextiles and Geomembranes.
- · Jothi's paper on Integrating Digital Twins with AI for Real-Time Intrusion Detection in Smart Infrastructure Networks has been published in International Conference on Intelligent Algorithms for Computational Intelligence Systems, IACIS 2024.
- ·Dr. B.Pitchaimanickam's "Multi-Verse Optimization for Node Localization in Wireless Sensor Networks has been published in Third International Conference on Electrical, Electronics, Information and Communication Technologies (ICEEICT) .
- ·Dr. SADAGOPAN S's paper on Enhanced Crop Protection: Mobile-Net V2 for Pest Identification has been published in 2024 Control Instrumentation System Conference (CISCON).
- ·D.Anitha's paper on Oral Cancer Detection and Classification Using Deep Learning with DenseNet121-CatBoost Classifier has been published in IEEE Xplore.

PUBLICATIONS

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- ·Dr.S.Krishnaveni's paper on optimized Tiny Machine Learning and Explainable AI for Trustable and Energy-Efficient Fog-Enabled Healthcare Decision Support System has been published in International Journal of Computational Intelligence Systems.
- ·Shaik Rasheeda Begums's paper on AI-based Depression Detection using Profile Information has been published in 2023 2nd International Conference on Automation, Computing and Renewable Systems (ICACRS).
- ·Shaik Rasheeda Begum's paper on Machine Learning-Based Depression Detection via Twitter Metadata has been publihshed in 2024 Third International Conference on Electrical, Electronics, Information and Communication Technologies (ICEEICT).
- ·Vinston Raja R's paper on Optimizing Routing Paths in Mobile Wireless Sensor Networks: A Sub-Flow Adaptive Multipath Approach for Energy Efficiency and Delay Sensitivity has been published in IEEE Xplore.
- ·Dr. Gopirajan PV's paper on A Machine Learning Model: Student Verification and Job Placement with Gradient Boosting Machines has been published in GRENZE International Journal of Engineering and Technology.
- ·Dr. Gopirajan PV's paper on Machine Learning Approach for Handling Imbalanced Students' Performance Data has been published in GRENZE International Journal of Engineering and Technology, 2024.
- ·Dr Maheshwari.A, Dr Vijayalakshmi K's paper on Sustainable sentiment analysis on E-commerce platforms using a weighted parallel hybrid deep learning approach for smart cities applications has been now published in Scientific Reports.
- ·A.SARANYA's paper on LionSense: Redefining Wildlife Monitoring and AI-Powered YOLOv5 Lion Detection and Classification has been published in Lecture Notes in Electrical Engineering.
- ·Reshmy A.K. paper on Advancing the Future of Agricultural Sustainability: Utilizing Deep Learning for Plant Disease Detection has been published 2nd IEEE International Conference on Advances in Information Technology.

PUBLICATIONS

CINTEL

- ·Reshmy A.K. paper on Effective Deep Learning Framework for Crop Pest Classification has been published in 2nd IEEE International Conference on Advances in Information Technology, ICAIT 2024 – Proceedings.
- ·DR.N.KANIMOZHI's paper on Effective Parkinson Disease Detection and Prediction Using Voting Classifier in Machine Learning has been published in Communications in Computer and Information Science.
- · Dr. Joseph James S paper on Deep Focus: Enhancing Depth of Field through Focus Stacking with U-Net Model has been published in IEEE Explore.
- ·Dr. Sudha Rajesh's paper on Real Time Mental Health Monitoring System using Machine Learning has been published inIEEE Digital Library.
- ·Dr. Sudha Rajesh's paper on Detection of AI Generated Text With BERT Model has been published in IEEE Digital Library.
- ·Dr. Sudha Rajesh's paper on Clustering-assisted privacy perseveration model for data mining has been published in International Journal of Ad Hoc and Ubiquitous Computing.
- ·Dr. Sudha Rajesh's paper on Alcoholic Consumption and Diabetes Prediction Using Machine Learning and Deep Learning has been published in IEEE Digital Library.
- ·Dr. Revathi A paper on Leveraging Machine Learning for Enhanced Mental Disorder Diagnosis Using EEG Signals has been published in IEEE Explore.
- Dr. Revathi A paper on Obstacle Detection in Path Planning for Unmanned Aerial Vehicles based on YOLO has been published in IEEE Explore.
- ·SUMATHY G paper on A distinctive and smart invasion recognition tool (SIRT) for defending IoT integrated ICS from cyber-attacks has been published in International Journal of Critical Infrastructure Protection. Oct 2024
- Anupama C G's paper on Intelligent Video Surveillance using Deep-Learning Models, has been published in 15th International Conference on Advances in Computing, Control, and Telecommunication Technologies, ACT 2024

PUBLICATIONS

CINTEL

- ·Anupama C G's paper on Detection of Cracks Using LeNet-5 with Mish Activation with a Comparison to the Performance of Swin Transformers has been published in 5th International Conference on Electronics and Sustainable Communication Systems, ICESC 2024 – Proceedings.
- ·Dr AR ARUNARANI's paper on A Novel Approach of Disease Diagnostic Prediction Using SMOTE Ensemble Classification has been published in Communications in Computer and Information Science, Sep 2024.
- · Dr. R. Usharani's paper on Enhancing Medical Image Diagnosis with Convolutional Neural Networks has been published in Second International Conference on Advances in Information Technology (ICAIT).
- ·Dr. A. ALICE NITHYA's paper on Toxic Comments Classification using LSTM and CNN has been published in IEEE Explorer.
- ·Dr. A. ALICE NITHYA's paper on Automated yoga pose recognition using enhanced chicken swarm optimization with deep learning has been published in Multimedia Tools and Applications, Oct 2024.
- ·T R SARAVANAN's paper on IoT-Enabled energy conservation in residential Buildings: Machine learning models for analyzing annual solar power consumption has been published in October 2024Solar Energy.
- ·T R SARAVANAN's paper on Reinforcement Learning for Patient-Centric Lighting Management System in Healthcare Sector, Oct 2024.
- ·Dr P Geetha's paper on Big data analytics in agriculture: cloud-based architecture for crop disease classification has been publishe4d in International Journal of Ad Hoc and Ubiquitous Computing, Vol. 47, No. 4.
- ·Amutha's paper on Pothole Detection from an Enhanced Aerial Image Using CNN Model has been published in Communications in Computer and Information Science.
- ·Akshya. J's paper on PART I: Introduction to statistical and quantum learning: Fundamentals of statistics has been published in CRC Press - Taylor and Francis Group.

PUBLICATIONS

CINTEL

- ·Akshya. J's paper on Introduction to Cloud Computing and Cloud Services has been published in IGI Global.
- ·DR.N.KANIMOZHI's paper on Self-powered Sensors: a Path to Wearable Electronics has been published in Self-powered triboelectric sensors for biomedical applications.
- ·Dr Naveen P's paper on Artificial Intelligence-Enabled Blockchain Technology and Digital Twin for Smart Hospitals, Wiley has been published in Digital Twin Application in Healthcare Facilities Management.
- ·Anupama C G's paper on Quantum Machine Learning: A Modern Approach has been published in Quantum evaluation models: Ensembles and QBoost.
- ·SUMATHY G's paper on Self-powered triboelectric sensors for biomedical applications has been published in Elsevier.
- ·Dr.S.Prithi's paper on Next-generation self-powered integrated sensing systems for the Industrial Internet of Things (IIoT) applications has been published in Academic Press, Elsevier.
- ·Dr.S.Prithi's paper on Fundamentals and applications of self-powered sensing systems has been published in Academic Press, Elsevier.
- ·Dr.S.Prithi's paper on Journey to Digital Twin Technology in Industrial Production: Evolution, Challenges, and Trends has been published in IEEE Press Wiley.
- · Dr.S.Prithi's paper on Cobots in Smart Manufacturing and Production for Industry 5.0 has been published in IEEE Press Wiley.
- ·RatnaKumari N's paper on Quantum Machine Learning: A Modern Approach has been published in Taylor and Francis.
- ·Dr.S.Prince Chelladurai, G. S. Shiny, S. V. Jeevitha, P. Swapna, R. Pavithra and S. Arulraj, paper on Revolutionizing Aquaculture Practices: IoT and Deep Learning-based Remote Monitoring for Sustainable Fish Farming has been published in 2024 5th International Conference on Smart Electronics and Communication IEEE Xplore.

PUBLICATIONS

CINTEL

- ·Dr. A. Sheryl Oliver's paper on "Improved Scalp Swarm Optimization with Generative Adversarial Network for Recognition of Motor Imagery EEG" has been published in Brazilian Archives of Biology and Technology.
- ·Dr. Sridevi Ponmalar P's paper on "Comparative Analysis of Machine Learning Models for Crop Yield Prediction Across Multiple Crop Types" has been published in SN Computer Science.
- ·Dr. Sridevi Ponmalar P's paper on "Impact of Feature Selection on Wheat Yield Prediction Using Machine Learning" has been published in International Journal of Design & Nature and Ecodynamics.
- ·Dr. M. S. Abirami's paper on "Latent Lip Print Classification Using MobileNet for Forensic Investigations" has been published in Biomedical Signal Processing and Control.
- ·Dr. Sherin Shibi C's paper on "Automatic Kidney Disease Prediction Using Deep Learning Techniques" has been published in Indonesian Journal of Electrical Engineering and Computer Science.
- ·Dr. C. Lakshmi and Anupama C G's paper on "Spark Framework-Based Crop Yield Prediction Using KR-PEclat and Mish-ANFIS-GRU Technique" has been published in International Journal of System of Systems Engineering.
- ·Dr. Robert Singh A's paper on "Automatic MRI Image Classification Using Attention and Residual CNNs With Enhanced Image Denoising Filters" has been published in IEEE Access.
- ·Dr. S. Krishnaveni's paper on "TwinSec-IDS: An Enhanced Intrusion Detection System in SDN-Digital-Twin-Based Industrial Cyber-Physical Systems" has been published in Concurrency and Computation: Practice and Experience.
- ·Dr. M. Uma and Kaviyaraj R's paper on "Transforming Education with Photogrammetry: Creating Realistic 3D Objects for Augmented Reality Applications" has been published in Computer Modeling in Engineering & Sciences.
- ·Babu K's paper on "Appearance and Motion-Based Unusual Crowd Events Detection Using Multiple Moving Objects" has been published in Multimedia Tools and Applications.

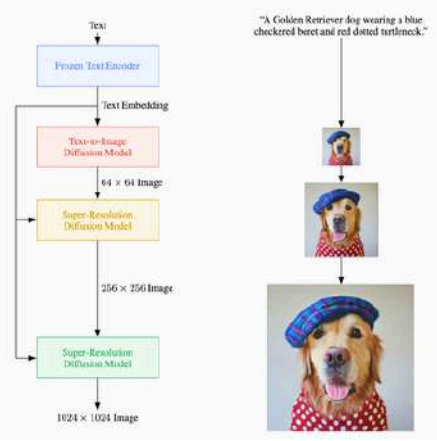
PUBLICATIONS

CINTEL

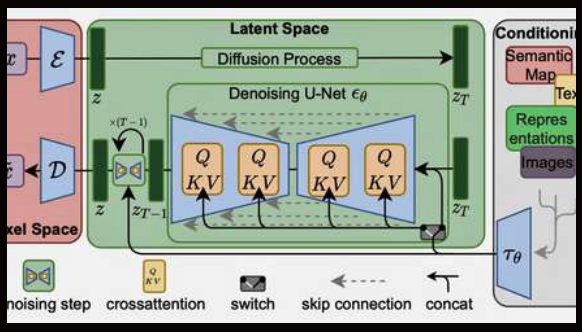
- ·Dr. S. P. Angelin Claret's paper on "The Smart Drug Delivery of Rotigotine Using Transdermal Patch for the Successful Management of Parkinson's Disease" has been published in Central Nervous System Agents in Medicinal Chemistry.
- ·Jothi's book on "NoSQL Database" has been published by Scientific International Publishing House.
- ·Dr. Gopirajan P V and Anupama C G's paper on "Potential Benefits of BIAs-Based ML/DL Models" has been published by Taylor and Francis.
- ·Dr. S. Prithi's paper on "Artificial Intelligence for Precision Agriculture" has been published in How AI Contributes to Precision Agriculture by Taylor and Francis.
- ·Dr. S. Prithi and Reshmy A.K.'s paper on "Knowledge Visualization Tools Relating to Agriculture" has been published in Artificial Intelligence for Precision Agriculture by Taylor and Francis.
- ·Akshya J's paper on "Bio-Inspired Algorithms in Machine Learning and Deep Learning for Disease Detection" has been published in Research Directions and Challenges in Bio-Inspired Algorithms for Machine Learning and Deep Learning Models in Healthcare by Taylor and Francis.
- ·Dr. A. R. Arunarani's paper on "Securing Neural Network in the Cloud: A Systematic Approach of Cloud Security Based on ANN-SVM Model" has been published in IEEE Xplore.
- ·Dr. Sherin Shibi C's paper on "Speaker Diarization in Multispeaker and Multilingual Scenarios" has been published in IEEE Xplore.
- ·Dr. Sridevi Ponmalar P's paper on "Methodology to Maximize the Output Voltage Harvested from Thermoelectric Generator by Using Luo Converter" has been published in IEEE Xplore.
- ·Dr. S. Krishnaveni's paper on "NeuroFlex: An IoT-Integrated Glove for Personalized Post-Stroke Rehabilitation with an Explainable Machine Learning-Based Monitoring System" has been published in Springer Lecture Notes.

DEEP DIVE INTO DIFFUSION MODELS: HOW MODERN IMAGE GENERATION ACTUALLY WORKS

The remarkable image generation capabilities powering tools like Midjourney and Stable Diffusion emerge from diffusion models—a class of generative algorithms whose mathematical underpinnings represent a profound departure from previous approaches, operating through a process analogous to reverse thermodynamics that systematically reconstructs complex visual information from random noise. At their core, diffusion models implement a two-phase process: a forward diffusion process that gradually adds Gaussian noise to training images according to a



variance schedule $\beta_1 \ldots \beta_t$ until they become indistinguishable from pure noise, paired with a learned reverse diffusion process that iteratively denoises data through a U-Net architecture trained to predict the noise component at each step—effectively learning the gradient of the log probability density (score function) of the data distribution. The training objective optimizes the network to minimize $L = E_{x,\varepsilon,t}[||\varepsilon - \varepsilon_\theta(x_t,t)||^2]$, where ε represents the actual noise added during forward diffusion and ε_θ represents the network's prediction—a seemingly simple loss function that belies



the mathematical elegance of how it implicitly learns to model complex probability distributions without the adversarial dynamics that plagued GANs or the explicit density modeling of earlier approaches.

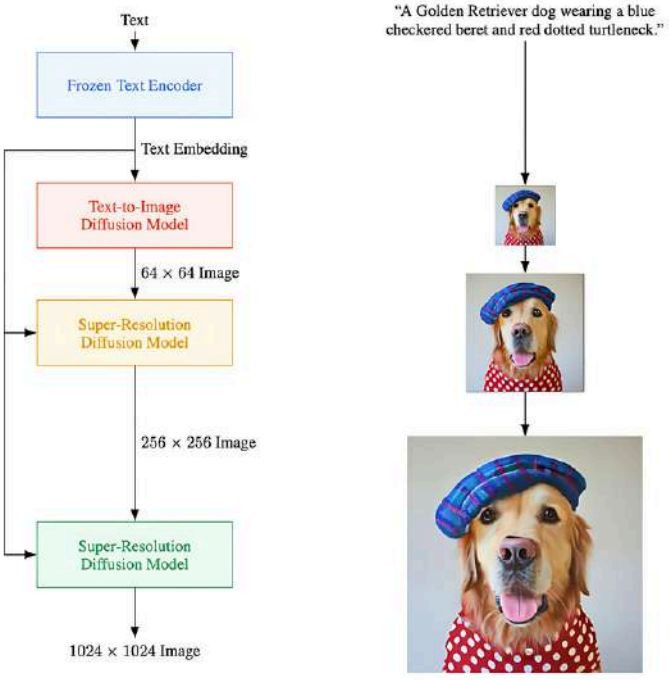
Modern implementations leverage classifier-free guidance—a technique that conditions the generation process on text embeddings through a branched architecture that jointly trains conditional and unconditional diffusion models, with the sampling process using a weighted combination of their predictions

DEEP DIVE INTO DIFFUSION MODELS: HOW MODERN IMAGE GENERATION ACTUALLY WORKS

controlled by a guidance scale parameter that balances fidelity to text prompts against diversity in generated outputs.

The sampling process reveals another crucial innovation: deterministic sampling algorithms like DDIM that dramatically reduce the required inference steps from thousands to dozens while maintaining generation quality, alongside techniques like attention rewiring that allows spatial control over the generation process through cross-attention maps between text tokens and image features.

The architectural scaffold supporting these models has evolved to incorporate elements like transformer blocks within U-Net backbones, cross-attention mechanisms for conditioning, and adaptive layer normalization—enhancements that collectively enable these systems to capture intricate relationships between visual concepts and language, representing one of the most significant advances in generative AI by bridging symbolic reasoning with perceptual understanding in a unified mathematical framework.



PATENTS & GRANTS

Dr.AR Arunarani published patent titled , “Artificial Intelligence based cloud security detecting device” and received an award for the same on 25-09-2024.

·Dr.Grace Shalini T published patent titled , “Design and development of automated attendance management system based on face recognition algorithms”” and received an award for the same on 25-10-2024.

·Dr.C Amuthadevi published patent titled , “Machine learning based intelligent system for data quality assessment and cleansing” and received an award for the same on 04-10-2024.

·Dr.Sakthiharan S published patent titled , “IOT based LPG Gas stand with gas level indicator” and received an award for the same on 01-10-2024.

PATENTS & GRANTS

·Dr.M Uma published patent titled , “A method of optimizing the process of Robotic Nano Spray Painting and a controller.

·Dr. S Nagendra Prabhu published patent titled , “Optimizing Financial Security:Cloud AI and Machine Learning in risk management and Fraud Detection” and received an award for the same on 06-12-2024.

·Dr.Dinesh G published patent titled , “Optimizing Financial Security:Cloud AI and Machine Learning in risk management and Fraud Detection” and received an award for the same on 06-12-2024.

·Sukanya Varshini K published patent titled , “Automated Biochemical Interpretation system for medical diagnostics with machine learning approach” and received an award for the same on 29-11-2024.

PATENTS & GRANTS

·Dr. B Jothi published patent titled , “IOT-enabled intelligent Fire Detection and Safety Management System” and received an award for the same on 13-12-2024.

·Dr. S Nagendra Prabhu published patent titled , “Cybercrime Detection and Prevention using automated machine learning in IOT Forensics” and received an award for the same on 20-12-2024.

·Vinston Raja R published patent titled , “IOT and ML based Medical Imaging Device” and received an award for the same on 26-09-2024.

·Dr. R Usharani , Dr. P Saranya published patent titled , “Eco friendly solar fruit harvesting device” and received an award for the same on 08-08-2024.

PATENTS & GRANTS

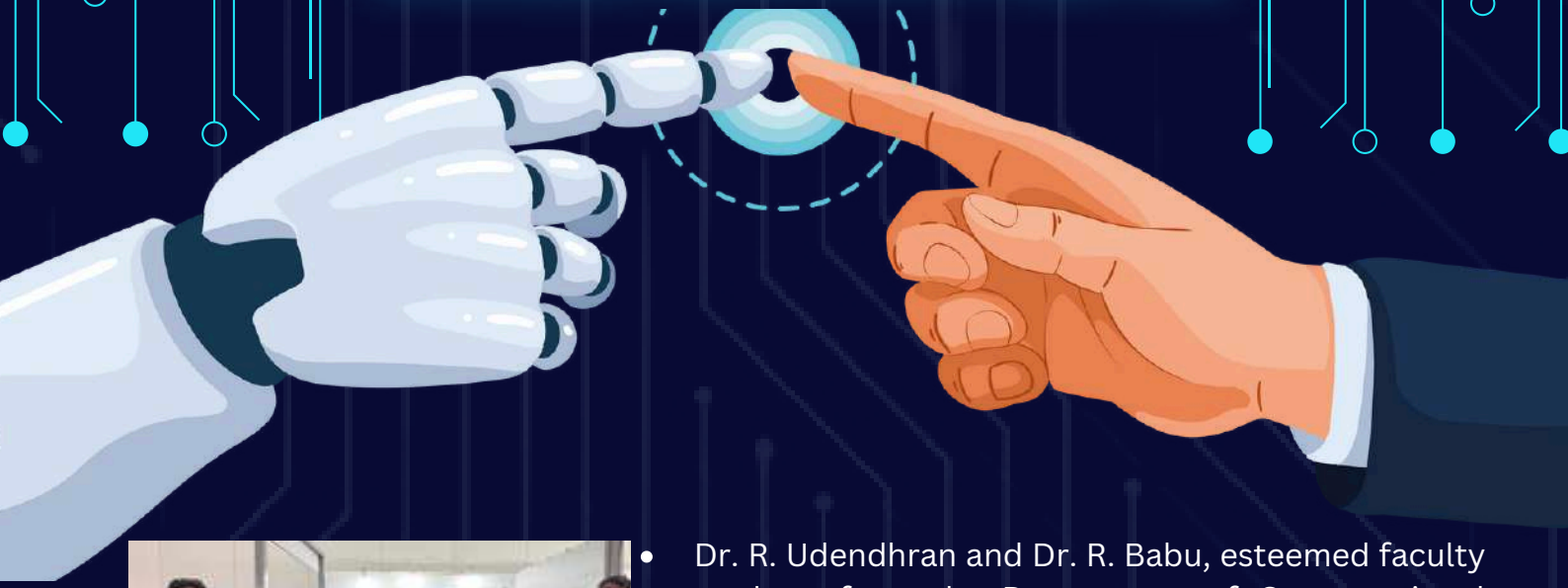
·Dr. R Beaulah Jeyavathana published patent titled , “AI based Diabetic Retinopathy Diagnosing Device”IOT and ML based Medical Imaging Device” and received an award for the same on 22-10-2024.

·Dr.Sakthiharan S published patent titled , “IOT based solar powered agriculture robot”LPG Gas stand with gas level indicator” and received an award for the same on 22-10-2024.

·Dr.Sakthiharan S published patent titled , “IOT based solar powered agriculture robot” and received an award for the same on 22-10-2024.

·Dr.Sakthiharan S published patent titled , “IOT based LPG Gas Stand with Gas level indicator” and received an award for the same on 01-10-2024.

INDUSTRIAL COLLABORATIONS



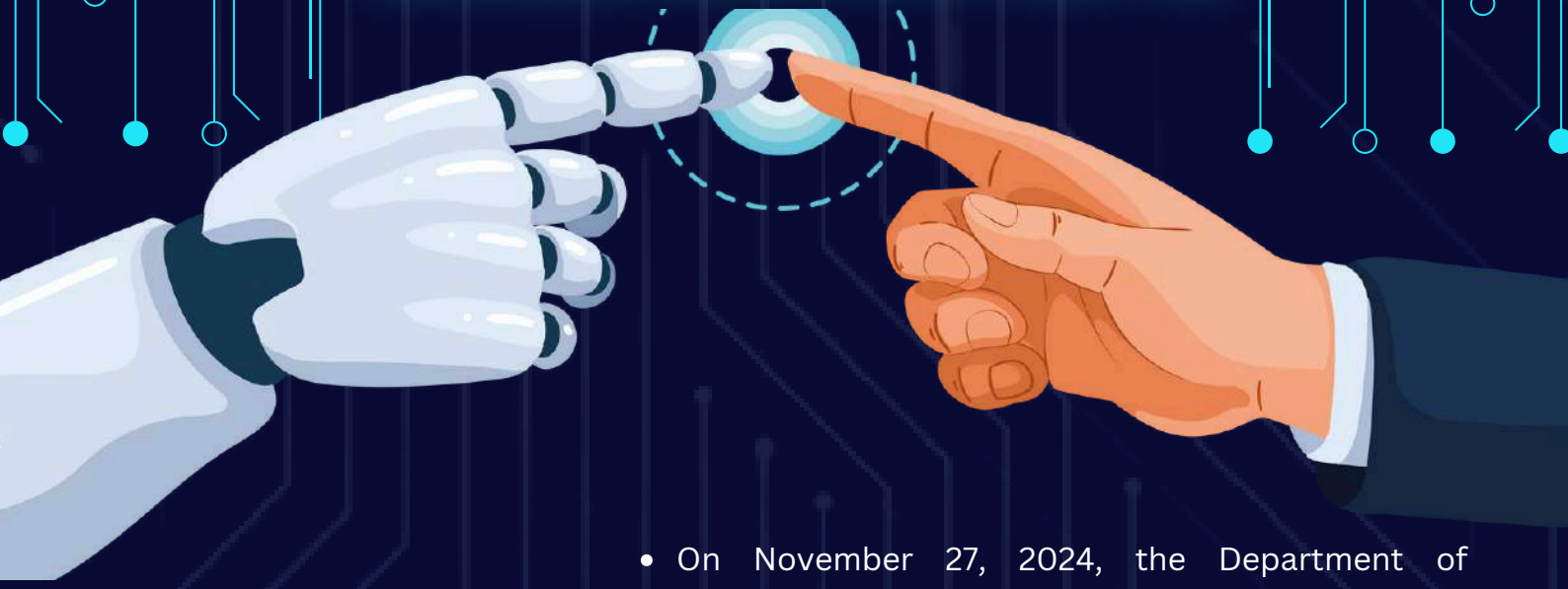
- Dr. R. Udendhran and Dr. R. Babu, esteemed faculty members from the Department of Computational Intelligence, recently participated in the prestigious international industry collider event, "Bengaluru Tech Summit 2024" held from November 19th to 21st, 2024.n technology .

- On November 23, 2024, Dr. R. Udendhran, Dr. R. Babu, Dr. G. Dinesh, and Dr. S. Selvakumarasamy from the Department of Computational Intelligence presented impactful industry projects at the Industrial Research and Innovation Summit (IRIS 2024).

- On November 23, 2024, Mr. Rangarajan (Pega Developer, Accenture) and Mr. Satheesh (Associate Senior Developer, Tech Mahindra) visited the AI Driven Discovery Hub and Advanced Technology Lab of the Department of Computational Intelligence.

- On November 23, 2024, Mr. Subhajit Sarkar (CBO, TIH Foundation for IoT & IoE, IIT Bombay) and Md. Anchal Srivastava (Sr. Program Manager) visited the AI Driven Discovery Hub and Advanced Technology Lab of the Department of Computational Intelligence.

INDUSTRIAL COLLABORATIONS



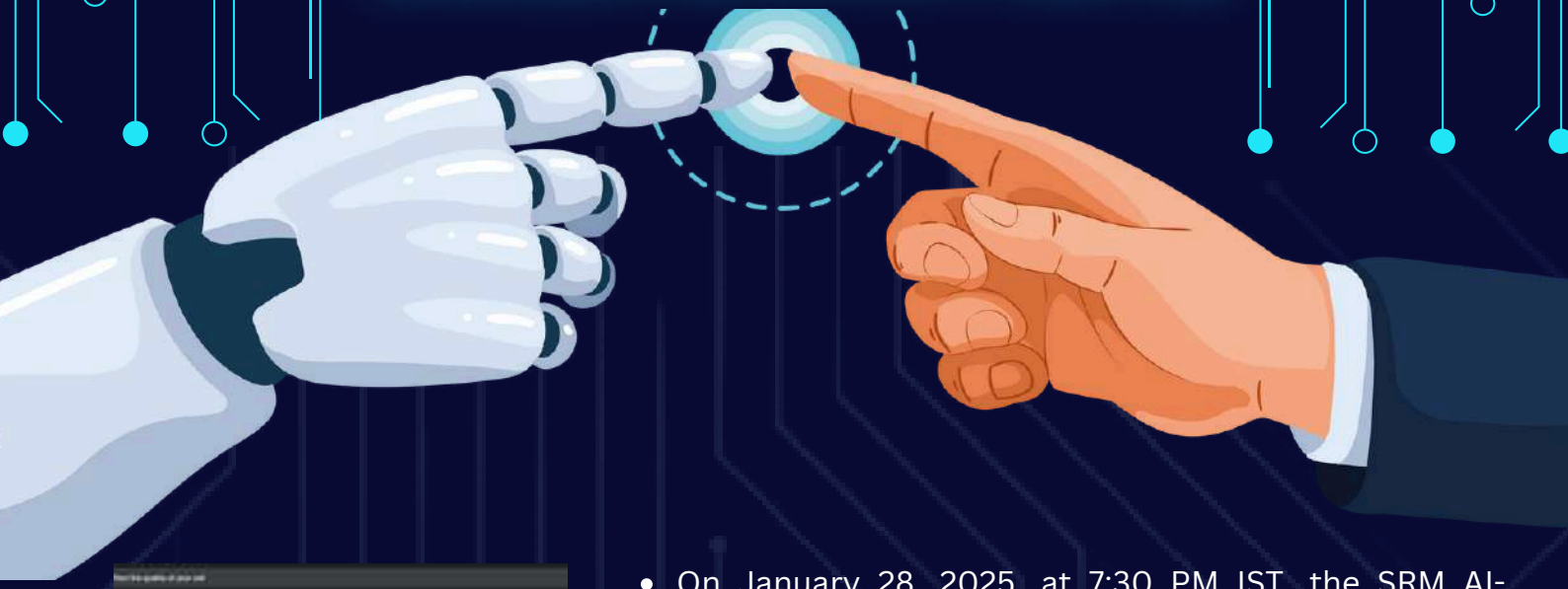
- On November 27, 2024, the Department of Computational Intelligence presented its ongoing industrial projects to Mr. Shivona and Mr. Ramakant from Spark Plus, Goa, through an online meeting. This presentation aimed to explore potential collaborations with Spark Plus on AI aspects of these projects.

- Dr. Revathi Venkataraman and Dr. R. Annie Uthra, along with Mr. Hari Shankar G and Mr. Shiva, presented internship certificates to students on November 14, 2024. The event was attended by the faculty team of Dr. R. Udendhran, Dr. R. Babu, Dr. G. Dinesh, and Dr. S. Selvakumarasamy

- On November 1, 2024, Mr. Paul Raj, Senior HR & Lead at Renault Nissan Automotive India Private Limited (RNAIPL), delivered the third series of the "From Code to Conduct: Navigating Professionalism in Tech" event.

- The faculty team of Dr. R. Udendhran, Dr. R. Babu, Dr. G. Dinesh, and Dr. S. Selvakumarasamy collaborated with Mercedes Benz (Mbition), Berlin, Germany, on a digital twin project on November 5th and 18th, 2024.

INDUSTRIAL COLLABORATIONS

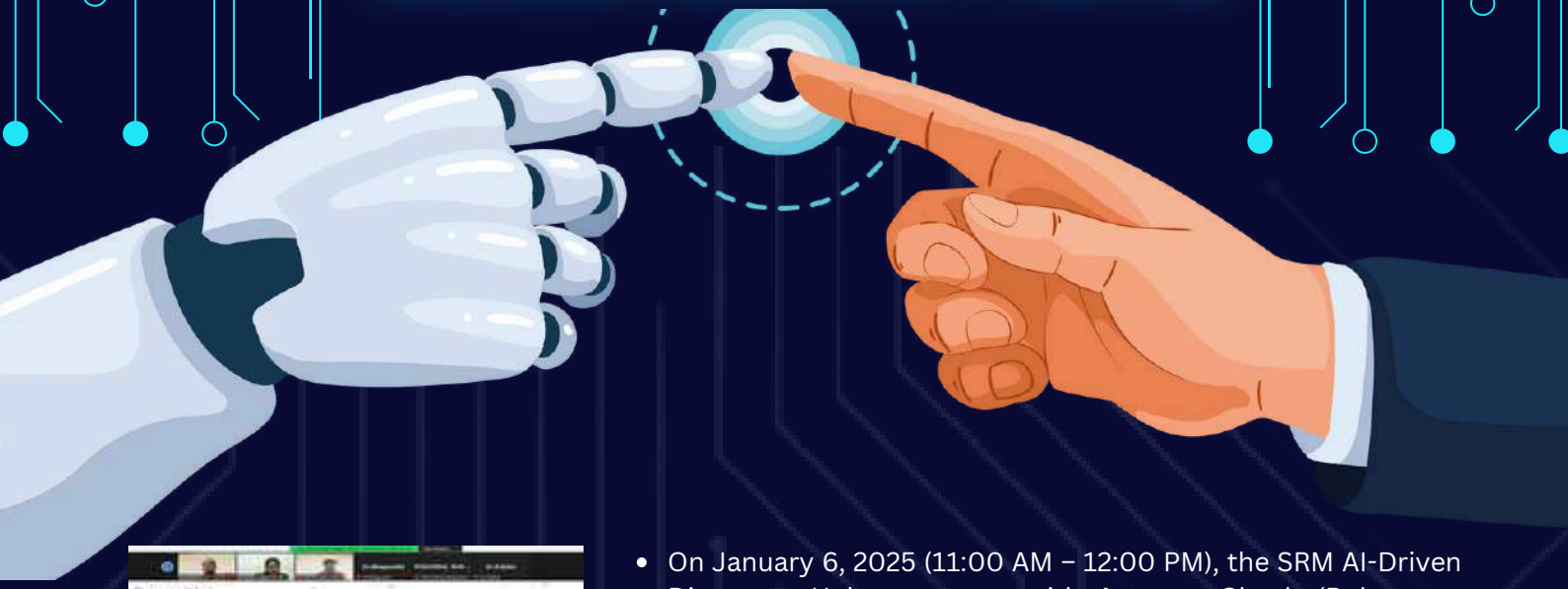


- On January 28, 2025, at 7:30 PM IST, the SRM AI-Driven Discovery Hub team conducted a virtual meeting with Mr. Shahul Hameed Abdul (TCS) to explore AI and computer vision applications in manufacturing, student-industry collaboration, and ethical AI policies.

- The SRM AI-Driven Discovery Hub team conducted a series of virtual meetings on January 10, 13, and 21, 2025, with Mr. Dilip Kumar (Technologist, Tata Steel) and other Tata Steel representatives to discuss project requirements for image analysis. The key discussions focused on multi-angle image processing, validation enhancements, algorithm refinement, and dataset access.

- On January 8, 2025 (3:00 PM – 4:30 PM), the SRM AI-Driven Discovery Hub team met with Mr. Anders Thomson (Chairman, Glocal) and Mr. Yachneet Pushkarna (Stakeholder, Glocal) to explore collaboration opportunities for the Indo-Nordic Innovation Institute at SRMIST. Discussions focused on establishing a Healthcare Hub, developing a Living Lab for healthcare innovation, and leveraging AI for modular healthcare solutions.

INDUSTRIAL COLLABORATIONS



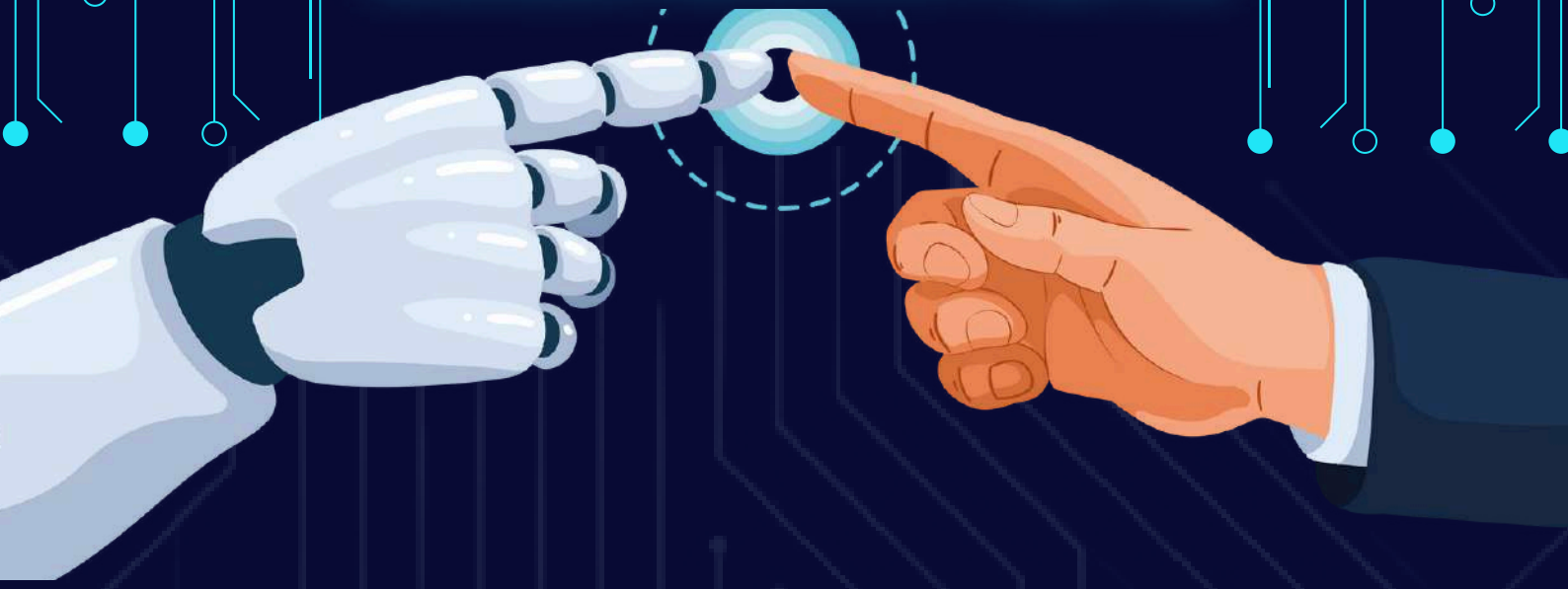
- On January 6, 2025 (11:00 AM – 12:00 PM), the SRM AI-Driven Discovery Hub team met with Anupam Ghosh (Boltzmann Labs) to discuss an interdisciplinary course inspired by the 2024 Nobel Prize in Chemistry. The course is tentatively set for inclusion by June 2025, with Prof. R. Udendhran as the primary contact. Both parties committed to ensuring industry relevance an

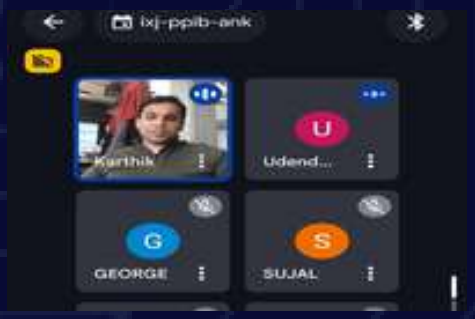
- On January 6, 2025 (1:00 PM – 4:00 PM), the SRM AI-Driven Discovery Hub team met with Prof. Robert Moskovitch (Ben-Gurion University, Israel) to explore collaborative research opportunities. A joint task force will be formed to define research areas, an MoU will be drafted, and a workshop/webinar is planned to engage faculty and students.

- On January 3, 2025 (11:35 AM – 1:00 PM), the SRM AI-Driven Discovery Hub team met with Dr. Shabbir Syed-Abdul (Taipei Medical University, Taiwan) to discuss collaborative research opportunities in biomedical informatics, AI-driven healthcare, and public health analytics.

- On January 27, 2025, Dr. R. Annie Uthra (Professor & Head, Department of Computational Intelligence), Dr. Revathy Venkataraman (Professor & Chairperson, School of Computing), Dr. R. Udendhran, and Dr. S. Selvakumarasamy visited Mahindra Research Valley to explore potential collaborations and discuss AI-driven digital twin use cases.

INDUSTRIAL COLLABORATIONS





- On January 22, 2025 (4:00 PM – 5:00 PM), the SRM AI-Driven Discovery Hub team met with Mr. Karthik VJ (Mercedes-Benz, Mbition, Berlin, Germany) to discuss digital twin development and the Raspberry Pi V5 PoC. The student team presented their Ansys-based digital twin creation workflow, covering 3D modeling, transformation workflows, and tool advantages.

- On January 21, 2025 (4:00 PM – 5:00 PM), the Mahindra Research Valley (MRV) team visited Lab UB803, AI-Driven Discovery Hub, to review ongoing projects and explore collaboration opportunities. Discussions covered industry partnerships with Renault Nissan, Mercedes-Benz, Sentient Scripts, and Chennai Metro Rail.

- On January 6, 2025 (4:00 PM – 5:00 PM), a strategic meeting was held with Mr. Rahul Lalwani, Principal Engineer, Mahindra, to discuss digital twins, Generative AI, and the AI Center of Excellence.

The Mathematics Behind GANs vs. Diffusion Models in Synthetic Media

The mathematical foundations of generative models have undergone a fascinating evolution, with Generative Adversarial Networks (GANs) and Diffusion Models representing two distinctly different approaches to the same challenge: creating high-quality synthetic media through fundamentally different probabilistic frameworks.

GANs operate on an elegant adversarial principle where two neural networks—the generator and discriminator—engage in a mathematical minimax game governed by the objective function min_G max_D [E_xp_data[log D(x)] + E_zp_z[log(1-D(G(z)))]], creating a dynamic equilibrium where the generator learns to map random noise vectors to increasingly convincing synthetic samples, while the discriminator simultaneously refines its ability to distinguish real from synthetic through binary cross-entropy optimization. By contrast, diffusion models embrace a fundamentally different mathematical paradigm based on thermodynamics, mplementing a forward diffusion process that systematically adds Gaussian

The Definition of GAN

A generative adversarial network (GAN) is a class of machine learning frameworks and a prominent framework for approaching generative artificial intelligence.

The Mathematics Behind GANs vs. Diffusion Models in Synthetic Media

noise to data according to a variance schedule $\beta_1 \ldots \beta_t$, followed by a learned reverse process that approximates the posterior p(x_{t-1}|x_t) through a neural network trained to predict noise components via mean squared error loss—effectively solving a sequence of denoising problems.

The optimization landscapes of these approaches reveal their distinct characteristics: GANs suffer from challenging training dynamics including mode collapse and non-convergence due to the adversarial nature of their loss function, while diffusion models exhibit more stable training by optimizing a well-defined likelihood that decomposes across diffusion steps, though at the cost of requiring many sequential sampling steps. Recent mathematical innovations have focused on bridging these paradigms

, with techniques like score-based generative modeling establishing theoretical connections between the gradient of log-likelihood (score function) in diffusion models and the adversarial gradients in GANs suggesting that both approaches target different aspects of the same

underlying probability distribution matching problem. The empirical performance differences stem from these mathematical foundations: GANs excel at generating sharp, realistic samples with fewer computational steps but remain challenging to train, while diffusion models produce more diverse outputs with better mode coverage and training stability, though requiring more sampling iterations—a trade-off that continues to drive research toward unified theoretical frameworks.

EVENTS AND WORKSHOPS

·SRMIST SIGAI Club: Ms. Yukta Kulkarni, an experienced speaker in the field, explored the ethical considerations in artificial intelligence, a topic of growing importance as technology continues to evolve. This event provided the students of SRM with valuable insights into responsible AI development and usage.

·Sowmya Henry, Module Lead at Mind Tree Ltd, Chennai, delivered a placement talk on "Cracking with Daysharing companies" for II, III and IV year School of Computing students on 8th Novemeber 2024.

·Placement Initiatives Department arranged a TCS Previous year Questions Practise Assesment for IV year students on 3rd and 9

EVENTS AND WORKSHOPS

·The Guest Lecture on "Procedural Content Generation in Games" was held on January 30, 2025, at 10:30 AM in Seminar Hall, 7th Floor, Tech Park 2. Dr. Tokarchuk, an expert in Game AI and Cognitive Science, led the session, exploring PCG applications, research insights, innovations, challenges, and future directions. The event attracted students and researchers, concluding with an engaging Q&A session.

The Department of Computational Intelligence, in collaboration with REACH, hosted Story Fest 2024 on November 8th to promote SDG 17. Led by Dr. R. Annie Uthra and Dr. Paromita Chakraborty, the event featured 25+ teams and was a success thanks to the judges and organizing committee.

·An exclusive online guest lecture by Prof. Sherali Zeadally, focusing on "Publishing in Elite Journals," was scheduled for November 12th November 2024 at 7:00 PM. This valuable session was designed for faculty members and research scholars, offering guidance on enhancing academic writing and publication success.

EVENTS AND WORKSHOPS

The AI DISCOVERY HUB at SRMIST KTR, powered by Sentient Scripts and the Department of Computational Intelligence, now features NVIDIA RTX GeForce GPUs. This upgrade boosts research in AI, Computer Vision, and Machine Learning, enabling faster computations and advanced data visualization for cutting-edge innovation.

On November 5, 2024, the Department of Computational Intelligence hosted a Project Exhibition for the Intel-backed "21AIV101P-RASPBERRY PI FUNDAMENTALS" course. Around 20 teams showcased IoT, AI, and ML prototypes using Raspberry Pi and Grove Pi kits, with industry experts from Zoho Corp enriching the event.

The faculty-student team developed VISTA, an AI-driven talking avatar for query handling, recognized by the Dean's Office for its innovation. Special thanks to Dr. Sasi Rekha Sankar and the Dean's Office for their support!

EVENTS AND WORKSHOPS

On January 30, 2025, RNTBCI industry leaders visited SRMIST's Department of Computational Intelligence to discuss AI collaborations. They explored student innovations at the AI-Driven Discovery Hub, with Mr. Balasubramaniam inspiring students on Industry 5.0 and AI transformation.

On January 28, 2025, the Directorate of Alumni Affairs and the Department of Computational Intelligence hosted an online talk, "Unlocking Career Opportunities After Graduation," by Bhavani Gowri Shankar, Team Lead at KPIT. The session included an engaging Q&A segment.

A workshop on "Discover the Entrepreneur In You" was held on January 7th, 2025, at Seminar Hall 1, UB, inspiring entrepreneurial potential. This was followed by a two-day hands-on training on ML, DL, and GenAI using oneAPI (Jan 9-10) in UB713 Lab, led by AI expert Ramaiah Chidambaram.

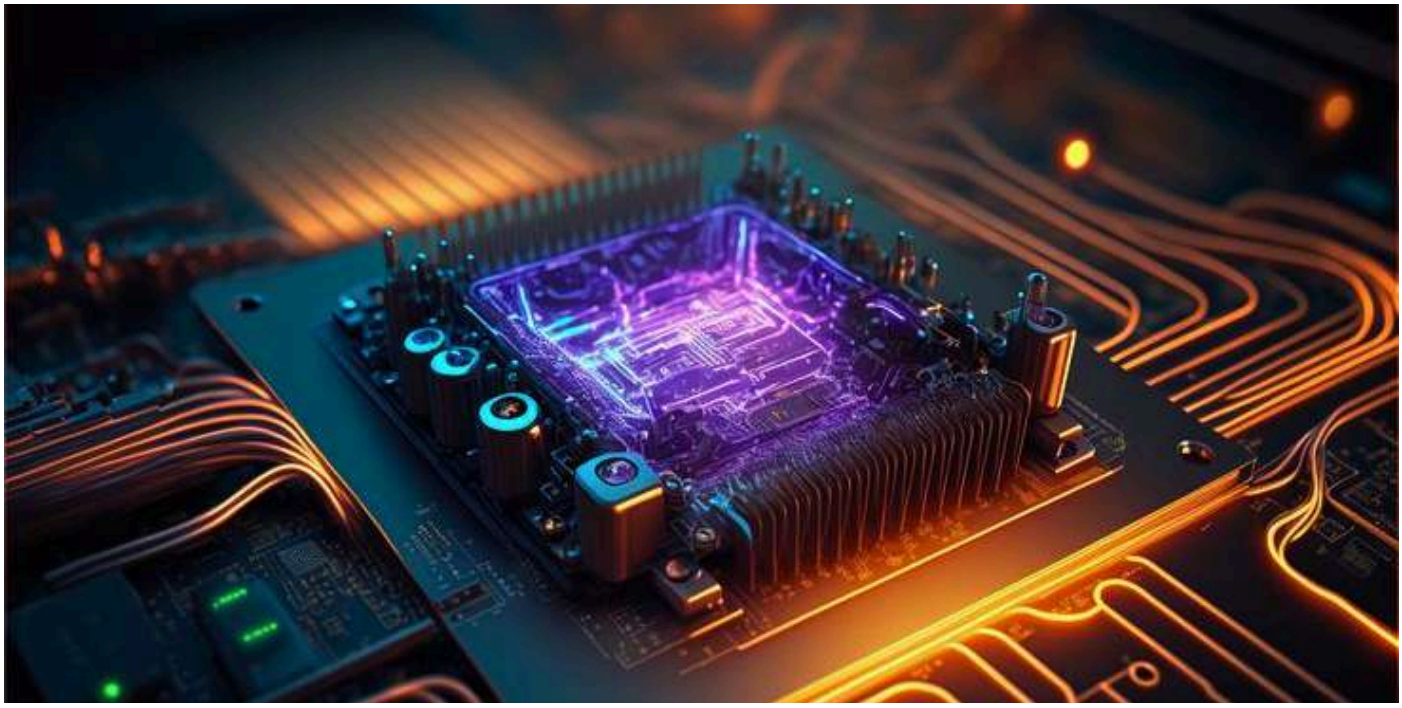
EVENTS AND WORKSHOPS

Unplaced students were grouped by skill level for targeted training. Medium and low-category students received placement training from CINTEL staff, while high-category students underwent assessments for job opportunities, ensuring tailored support to enhance employability.

From January 27-31, 2025, CINTEL conducted a placement refreshment program for unplaced students, focusing on C programming. Led by Dr. S. Sivaji, Dr. M. Kiruthika, and Dr. Gowtham, the sessions included problem-solving exercises, mock assessments, and technical interview preparation to enhance placement readiness.

The Architecture of Multimodal Models: Combining Text, Audio, and Visual Synthesis

Imagine an AI that simultaneously processes a whispered request, analyzes a blurry image, and crafts a detailed response—all through a single architectural framework that's revolutionizing how machines perceive our world. Modern multimodal models accomplish this remarkable feat through intricate neural architectures that weave together diverse perception streams. These systems don't simply process text, images, and sound in isolation—rather, they perform a sophisticated neural dance where information flows across modality boundaries, creating rich, unified representations that capture the essence of our multimodal world.



At their foundation lies a fascinating technical innovation:

specialized encoders transform raw inputs (pixels, waveforms, or words) into numerical representations that, despite originating from completely different data types, can meaningfully interact within a shared mathematical space. This is achieved through cross-attention mechanisms that function like neural translators between modalities, allowing text embeddings to query visual features or audio patterns to influence textual understanding.

The most compelling aspect of these architectures is how they mirror human cognition. While we effortlessly integrate what we see, hear, and read, machines must explicitly learn these connections through contrastive learning—a process where paired examples (like images and their descriptions) gradually teach the model to recognize semantic relationships across modality boundaries.

This training approach creates fascinating emergent properties, where concepts like "melodic" or "bright" develop consistent representations regardless of whether they appear in text, audio, or visual contexts.

The computational elegance of these unified transformer blocks conceals remarkable complexity—balancing gradient flows across different scales, managing varying temporal dynamics, and maintaining semantic coherence across modalities presents ongoing research challenges that continue to drive innovations in this rapidly evolving field.

The Impact of Multimodal models is huge in the field of text and audio generation

Future Directions: Towards Embodied Intelligence and Interactive Multimodality

The evolution of multimodal models is rapidly pushing towards systems that don't just passively perceive, but actively engage with their environments. A key focus is on integrating these architectures with embodied agents, allowing them to act and learn through sensory feedback. Imagine a robotic assistant that not only understands your spoken instructions but also visually navigates a cluttered room, adjusting its actions based on real-time auditory cues. Furthermore, interactive multimodality, where the model can generate outputs in multiple modalities and respond dynamically to user input, is gaining traction. This includes systems that can generate visual explanations for audio events, provide textual summaries of complex scenes, or even engage in multimodal dialogues where the user can seamlessly switch between voice, text, and visual input.

Date: _____ Section: _____

Riddle Me This

Directions: Read the sentence and write the answer to the riddles.

_____ 1. I mimic your voice, I steal your face,
Yet I'm no thief, I leave no trace.
I can make the past seem brand new,
Or show a future that's not yet true.
What am I?

_____ 2. With a stroke of code, I paint so bright,
Yet I've never seen a day or night.
You type the words, and I create,
A masterpiece that wasn't fate.
What am I?

_____ 3. I sound just like your favorite star,
Yet I'm not them—how bizarre!
I speak in tones both high and low,
But to real emotions, I'll never grow.
What am I?

_____ 4. I dance and move, I laugh and cry,
Yet I was never born, nor will I die.
I'm pixels deep, but feelings wide,
My existence? Just math inside.
What am I?

*Best Submission will receive complimentary vouchers

Date: _____ Section: _____

Riddle Me This

Directions: Read the sentence and write the answer to the riddles.

_____ 5. I write the words without a hand,
Create new tales on your command.
I learn from books but never read,
Feeding on data is all I need.
What am I?

_____ 6. I change the sky, I change your face,
Erase the past without a trace.
A world remade by algorithmic might,
Turning fiction into sight.
What am I?

_____ 7. They think I'm back, but I am not,
A spectral form, a voice forgot.
From concerts bright to final calls,
I walk again in digital halls.
What am I?

_____ 8. Your mouth moves, but not your voice,
It's someone else's—wasn't your choice!
With clever tech, I shift the scene,
To make you say things never seen.
What am I?

*Best Submission will receive complimentary vouchers

MEET THE TEAM!

Swetanshu Agrawal

Samudra Banerjee

Bidipta Biswas

Adhikya Sharma

இதனை இதனால் இவன்முடிக்கும் என்றாய்ந்து
அதனை அவன்கண் விடல்.

Assured this man will do this task this way, Leave it to him.

இந்தச் செயலை இக்கருவியால் இன்னவன்
செய்துமுடிப்பான் என்று ஆராய்ந்த பிறகே அத்
தொழிலை அவனிடம் ஒப்படைக்க வேண்டும்.

**'This man, this work shall thus work out,' let
thoughtful king command;
Then leave the matter wholly in his servant's hand.**