



This short-term course is meticulously designed to provide participants with a comprehensive understanding of recent advances in computer vision, with a focus on both theory and real-world applications. Topics covered include cutting-edge image processing techniques and deep learning models, addressing challenges such as object recognition, human activity analysis, and underwater object detection—critical in areas like marine exploration and surveillance.

Participants will also gain hands-on experience developing computer vision applications, providing them with practical skills to tackle real-world projects. The course is ideal for students, researchers, and professionals looking to advance their expertise in this rapidly evolving field.

Additionally, the course offers an academic exploration of the strengths of computer vision in fields such as autonomous systems, augmented reality, and underwater detection. By the end of the course, participants will be equipped with the technical knowledge to contribute to the transformative potential of modern computer vision systems.

#### Day 1 – Foundations of Generative AI & Vision

- **Session 1 (Theory):** Mathematical Foundations of Neural Networks, CNNs, and Transformers
- **Session 2 (Theory):** Introduction to Generative AI: GANs, VAEs, and Diffusion Models
- **Session 3 (Lab):** Implementing a basic GAN in PyTorch for MNIST image generation

#### Day 2 – Generative Models in Depth

- **Session 1 (Theory):** GAN Variants (DCGAN, CycleGAN, StyleGAN) and their Applications in Vision
- **Session 2 (Theory):** Variational Autoencoders and Diffusion Models for Image Synthesis
- **Session 3 (Lab):** Hands-on with StyleGAN and Diffusion models for synthetic face generation

#### Day 3 – Robustness, Generalization, and Ethics

- **Session 1 (Theory):** Few-Shot and Zero-Shot Learning with Generative Models
- **Session 2 (Theory):** Robustness, Generalization, and Ethical Challenges in Generative AI
- **Session 3 (Lab):** Training a text-to-image diffusion pipeline (Stable Diffusion / DALL·E mini)

#### Day 4 – Applications Across Domains

- **Session 1 (Theory):** Generative AI in Healthcare and Medical Imaging (Data Augmentation, Rare Disease Detection)
- **Session 2 (Theory):** Generative Vision for AR/VR, Human-Computer Interaction, and Creative AI
- **Session 3 (Lab):** Medical imaging augmentation using GANs and generative AR demo with PyTorch/Keras

#### Day 5 – Future Directions and Real-World Use Cases

- **Session 1 (Theory):** Generative AI in Autonomous Systems (Self-Driving Cars, Drones, Smart Surveillance)
- **Session 2 (Theory):** Environmental & Industrial Applications (Wildlife Monitoring, Digital Twins, Industry 4.0)
- **Session 3 (Lab):** Integrated Project – Build a generative vision system (choose from: self-driving car simulation, wildlife monitoring, or AR content creation)

#### Key Speakers:

- Dr. Prantik Chatterjee, MathWorks
- Prof. Sujit Das, NIT Warangal
- Dr. Debabrata Samanta, CIT Program Head, RIT Kosovo
- Dr. Ratnakar Dash, NIT Rourkela
- Dr. Anup Nandy, NIT Rourkela
- Dr. Dhanonjoy Bhakta, IIIT Ranchi
- Dr. Puneet Kumar Jain, NIT Rourkela
- Dr. Arnab Ghosh, NIT Rourkela
- Dr. Kaustuv Nag, IIIT Guwahati
- Dr. Prasenjit Dey, NIT Rourkela, Ex-Intel
- Dr. Panthadeep Bhattacharjee, NIT Rourkela



**National Institute of Technology  
Rourkela**

**Short Term Course and Faculty  
Development Programme  
(Online Mode)**

**On**

**Generative AI for Computer  
Vision: Trends, Tools, and  
Transformations (GAICV-2025)**

**14<sup>th</sup> - 18<sup>th</sup> November 2025**

**Coordinator**

**Dr. Prasenjit Dey**

**Chairperson**

**Prof. Bidhudutta Sahoo**

**Organized By**

**Dept. of Computer Science and  
Engineering**

**National Institute of Technology  
Rourkela, Odisha - 769008**



## Introduction:

In contemporary technology landscapes, computer vision has emerged as a pivotal discipline, enabling machines to comprehend and interpret visual data, effectively bridging the gap between human perception and artificial intelligence. Its manifold advantages are prominently demonstrated in domains such as autonomous driving, healthcare diagnostics, retail optimization, and security enhancements, where it bolsters decision-making, automates tasks, and fortifies safety measures. However, persistent challenges include the demand for robustness across varying environmental conditions, the complexities entailed in managing object occlusion, and the ethical considerations surrounding privacy preservation and algorithmic bias mitigation. Nonetheless, the undeniable merits of computer vision hold the promise of revolutionizing industries, optimizing operational efficiencies, and ushering in innovative applications such as augmented reality, human-computer interaction, and smart urban development. As scholars and technologists grapple with these intricacies, the trajectory of computer vision unfolds with limitless potential for innovation and societal progress.

## Online Account Details:

**Account No:** 10138951784

**Account Name:** CONTINUING EDUCATION  
NIT ROURKELA

**IFSC No:** SBIN0002109

**Branch:** State Bank of India, NIT Campus  
Rourkela

## About the Institute:

National Institute of Technology (NIT), Rourkela is one of the premier national level institutions in our country under MoE, Govt. of India, and is responsible for providing technical education. For knowing further details, please visit <https://www.nitrkl.ac.in/>

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## About the Department:

The department of CSE was established with the vision to prepare its students for professional employment and graduate education through study and implementation of the fundamental principles of theory, abstraction, and software design, while at the same time presenting the ethical and social issues associated with computer science.

The department offers various UG courses with a mission to provide high-quality education that prepares the graduates for success in their professional practice and advanced studies. The department also offers M. Tech in Computer Science, Information Security, and Software Engineering; and Ph. D. for regular as well as sponsored candidates.

Please visit <https://website.nitrkl.ac.in/CS/>

## Online Registration Form:

<https://forms.gle/os844ysH3FgRvE4E6>

## Registration Details:

Category	Online Registration Fee in INR
Research Scholars/ PG / UG Student	700/-
Faculty from Engineering Institutes	800/-
Engineers from Industry and R&D Organizations	900/-
No registration fee for students / staffs of NIT Rourkela	

## Important Dates:

**Registration Deadline: 14<sup>th</sup> November 2025**

**Short-term Course Date: 14<sup>th</sup>-18<sup>th</sup> November 2025**

## Contact us:

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