# Ankan Kumar Bhunia

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## Research Interests

Computer Vision & Machine Learning, 3D Vision, 3D Reconstruction, Neural Rendering, Generative Modelling, Synthetic Data Generation, Few-shot Learning, Anomaly Detection, handwriting/Sketch Generation.

## Education

**University of Edinburgh, UK** 2023 - Present
- PhD in the School of Informatics (Visual Computing Group)
- Supervisor: Dr. Hakan Bilen, Dr. Changjian Li

**Jadavpur University, Kolkata, India** 2016 - 2020
- B.E Electrical Engineering (CGPA 8.6/10)

## Experience

**MBZUAI, Abu Dhabi, UAE** November, 2020 - April, 2023
- *Research Assistant at Computer Vision Lab*
- *Advisor*: Dr. Fahad Shahbaz Khan, Dr. Salman Khan
- *Research Direction*: Generative models, Document analysis, Handwriting generation
- *Collaborated with*: Dr. Mubarak Shah, University of Central Florida, USA
- *Description*: During my time here, I published several of my works in **1**xCVPR, **2**xICCV, **1**xECCV.

**University of Manitoba, Canada** May, 2019 - August, 2019
- *Research Intern under Mitacs Globalink Internship program*
- *Title*: "Flexible deep learning models in computer vision"
- *Advisor*: Dr. Yang Wang, Associate Professor
- *Description*: I worked on one-shot scene-specific crowd counting that adapts to specific scene.

**Robert Bosch, Bangalore, India** May, 2018 - July, 2018
- *Research Intern at Computer Vision Lab, RTC Department*
- *Title*: "Synthetic to Photo-realistic Image Generation"
- *Advisor*: Dr. Amit Arvind Kale, Principal Senior Expert
- *Description*: I worked on various domain adaptation techniques and methods.

**Indian Institute of Technology (IIT) Roorkee, India.** May, 2017 - june, 2020
- *Advisor*: Dr. Partha Pratim Roy
- *Research Direction*: Machine learning, computer vision, pattern recognition, document analysis
- *Collaborated with*: Dr. Umapada Pal, CVPR Unit, ISI-Kolkata

## Selected Research

1. **Ankan Bhunia**, Changjian Li, Hakan Bilen, *"Odd-One-Out: Anomaly Detection by Comparing with Neighbors," arXiv*, 2024 - **[pdf]**

2. **Ankan Bhunia**, Changjian Li, Hakan Bilen, *"Looking 3D: Anomaly Detection with 2D-3D Alignment," IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2024 - **[pdf]**

3. Amandeep Kumar, **Ankan Bhunia**, Sanath Narayan, Hisham Cholakkal, Rao Anwer, Jorma Laaksonen, Salman Khan, Ming-Hsuan Yang, Fahad Shahbaz Khan, *"Generative Multiplane Neural Radiance for 3D-Aware Image Generation," IEEE International Conference on Computer Vision (ICCV)*, 2023 - **[pdf]**

4. Amandeep Kumar, **Ankan Bhunia**, Sanath Narayan, Hisham Cholakkal, Rao Anwer, Jorma Laaksonen, Fahad Shahbaz Khan, *"Cross-modulated Few-shot Image Generation for Colorectal Tissue Classification," International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI)*, 2023 - **[pdf]**

5. **Ankan Bhunia**, Salman Khan, Hisham Cholakkal, Rao Muhammad Anwer, Jorma Laaksonen, Mubarak Shah, Fahad Shahbaz Khan, *"Person Image Synthesis via Denoising Diffusion Model," IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2023 - **[pdf]**

6. **Ankan Bhunia**, Salman Khan, Hisham Cholakkal, Rao Muhammad Anwer, Fahad Shahbaz Khan, Jorma Laaksonen, Michael Felsberg, *"DoodleFormer: Creative Sketch Drawing with Transformers," European Conference on Computer Vision (ECCV)*, 2022 - **[pdf]**

7. **Ankan Bhunia**, Salman Khan, Hisham Cholakkal, Rao Muhammad Anwer, Fahad Shahbaz Khan, Mubarak Shah, *"Handwriting Transformers," IEEE International Conference on Computer Vision (ICCV)*, 2021 - **[pdf]**

8. Ayan Bhunia, Abhirup Das, **Ankan Bhunia**, Sairaj Kishore, Partha Roy, *"Handwriting Recognition in Low-resource Scripts using Adversarial Learning," IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2019 **[pdf]**

9. **Ankan Bhunia**, Ayan Bhunia, Aneeshan Sain, Partha Roy, *"Improving Document Binarization via Adversarial Noise-Texture Augmentation," IEEE International Conference on Image Processing (ICIP)*, 2019 **[pdf]**

10. Ayan Bhunia, **Ankan Bhunia**, Shuvozit Ghose, Partha Roy, Umapada Pal, *"A Deep One-Shot Network for Query-based Logo Retrieval," Pattern Recognition* (I.F. 8.518) **[pdf]**

11. **Ankan Bhunia***, Aishik Konwer*, Abir Bhowmik, Ayan Bhunia, Partha Roy, *"Script Identification in Natural Scene Image and Video Frames using an Attention-based Convolutional-LSTM Network," Pattern Recognition* (I.F. 8.518) - **[pdf]**

12. **Ankan Bhunia**, Ayan Bhunia, Prithaj Banerjee, Aishik Konwer, Abir Bhowmik, Partha Roy, Umapada Pal, *"Word Level Font-to-Font Image Translation using Convolutional Recurrent Generative Adversarial Networks," International Conference on Pattern Recognition (ICPR)*, 2018 - **[pdf]**

13. Ayan Bhunia, Subham Mukherjee, Aneeshan Sain, Abir Bhowmik, **Ankan Bhunia**, Partha Roy, Umapada Pal, *"Indic Handwritten Script Identification Using Offline-Online Multi-modal Deep Network," Information Fusion* (I.F. 17.564) - **[pdf]**

14. **Ankan Bhunia**, Alireza Alaei, Partha Roy, *"Signature Verification Approach using Fusion of Hybrid Texture Features," Neural Computing and Applications* (I.F. 5.606) - **[pdf]**

15. Aishik Konwer, Ayan Bhunia, **Ankan Bhunia**, Prithaj Banerjee, Partha Roy, Umapada Pal, *"Staff Line Removal using Generative Adversarial Networks," International Conference on Pattern Recognition (ICPR)*, 2018 - **[pdf]**

16. Ayan Bhunia, Abir Bhowmik, **Ankan Bhunia**, Aishik Konwer, Partha Pratim Roy, Umapada Pal, *"Handwriting Trajectory Recovery using End-to-End Deep Encoder-Decoder Network," International Conference on Pattern Recognition (ICPR)*, 2018 - **[pdf]**

## Selected Patents

1. Amandeep Kumar, **Ankan Bhunia**, Hisham Cholakkal, Sanath, Narayan, Rao Anwer, Fahad Shahbaz Khan, *"System and Method for Handwriting Generation", 2024,* ID: **US20240161360A1**

2. **Ankan Bhunia**, Salman Khan, Hisham Cholakkal, Rao Anwer, Fahad Shahbaz Khan, *"System and Method for Handwriting Generation", 2023,* ID: **US11756244B1**

## Research Areas

**(1) Applied Computer Vision:** Synthetic data generation for real-world tasks (photo-realistic rendering, diffusion-based generation, LLM-guided automatic data generation), Anomaly detection in real-world objects.
**(2) Generative Modelling:** GANs, Denoising Diffusion models, VAE, Autoregressive models.
**(3) Applications of Image Generation:** Creative AI-art generation, Few-shot generation, Sparse image data generation, Text-to-Image generation, Conditional GANs.
**(4) 3D vision applications:** 3D generative modelling, 3D reconstruction problems.
**(5) Semi-supervised & Unsupervised Models:** Few-shot image detection, Domain adaptation.
**(6) Document Image Analysis:** Vision tasks for sparse image data like sketch/handwriting.

## Technical Skills

**Programming Languages:** Python, C, MATLAB, HTML/CSS
**Deep Learning Framework:** PyTorch, Tensorflow, Keras
**Developer Tools:** Git, Docker, Google Cloud Platform, VS Code, PyCharm
**Miscellaneous:** Blender, Pybullet, OpenCV, OpenAI gym, Numpy, Matplolib, Pandas, Scikit-Learn.

## Notable Details

(1) I have over **600** *citations* on *Google Scholar* with *h-index* **12**.
(2) I have published in A* computer vision conferences (i.e. **CVPR**, **ICCV**, **ECCV**).
(3) I have served as a reviewer for **TPAMI**, **ICCV ECCV**, **CVPR**, **WACV**.

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## Links

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