Ankita Ghosh

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Education

ETH Zurich September 2022 – Present
MSc in Computer Science (Major in Visual and Interactive Computing) *CGPA: 5.48/6.0*
Relevant Coursework: 3D Vision, Digital Humans, Computer Vision, Computer Graphics, Big Data

Manipal Institute of Technology August 2018 – June 2022
B.Tech in Computer Science and Engineering (Minor in Graphics and Visualization) *CGPA: 9.27/10*
Relevant Coursework: Deep Learning, Digital Image Processing, Augmented and Virtual Reality

Experience

Visiting Graduate Scholar, ARCADE Lab, Johns Hopkins University July 2025 - Present
Supervisor: Prof. Dr. Mathias Unberath and Dr. Lalithkumar Seenivasan *Baltimore, USA*

- Working on **robotic grasp** and **semantic** affordance generation for surgical tools using **simulation** platforms.
- Worked on **neural surface rendering** and **6D pose estimation** to construct **dynamic digital twins** of surgical equipment in operating rooms.

Machine Vision Engineer Intern, Stryker October 2024 – March 2025
Sensing and Machine Vision Team *Freiburg, Germany*

- Developed a surgeon **tracking** and **keypoint detection** pipeline on operating room footage for surgical planning.
- Calibrated RGB camera and optical trackers for **depth estimation** of the detected keypoints to ultimately design a deployable workflow for surgical workload estimation.

Student Researcher, VLG, ETH Zurich March 2023 - September 2024
Supervisor: Prof. Dr. Siyu Tang and Korrawe Karunratanakul | [*semester project*] *Zurich, Switzerland*

- Extended single-person generative models to produce motion for two people using a **correlation model** and **contact-based annotations**.
- Generated **two-person interactions** from textual description by applying foundational **vision-language models** and developing a **transformer-based diffusion model** pipeline.

Mitacs Globalink Research Intern, SIRRL, University of Waterloo June 2021 – September 2021
Supervisor: Prof. Dr. Kerstin Dautenhahn and Prof. Dr. Moojan Ghafurian *Ontario, Canada*

- Developed an **emotion recognition system** that can process speech and respond with appropriate emotion in real-time by implementing the computational model of **affect control theory**.
- Designed facial expressions for **social robot Furhat** using **facial action coding system**, and developed a novel model that maps emotions to these facial gestures based on **semantic differential values**.

Vision Engineer Intern (Part-Time), Kumudha Health Tech. November 2019 – October 2020
Director: Dr. Hareesha K S *Manipal, India*

- Performed image processing operations like **registration and fusion** of CT and MRI medical data.
- Rendered 3D anatomical parts in a **VR** headset with the aid of scientific visualization software and game engine, and developed GUI for **real-time operations** like slicing and free-hand snipping on the 3D model.

Publications

[1] R. Naidu, **A. Ghosh**, Y. Maurya, S. R Nayak, S. S. Kundu, **IS-CAM: Integrated Score-CAM for axiomatic-based explanations**, *Responsible Computer Vision, CVPR-W 2021* [paper]

[2] **A. Ghosh***, S. Khose*, A. Tiwari*, **Semi-Supervised Classification and Segmentation on Aerial Images**, *Tackling Climate Change with Machine Learning, NeurIPS-W 2021* [paper]

[3] V Manushree*, S. Saxena*, P. Chowdhury*, M. Varma*, H. Rathod*, **A. Ghosh**, S. Khose, **Extraction of Color Information from Images for Generation of Colored-Sketches**, *Machine Learning for Creativity and Design, NeurIPS-W 2021* [paper]

[4] **A. Ghosh**, S. Khose, Y. S. Kamath, Neetha I. R. Kuzhuppilly, Harish Kumar J R, **Fovea Segmentation Using Semi-Supervised Learning**, *INDICON 2023* [paper]

[5] S. Khose, **A. Ghosh**, Y. S. Kamath, Neetha I. R. Kuzhuppilly, Harish Kumar J R, **Explainable Classification of Macular Degeneration Using Deep Learning**, *INDICON 2023* [paper]

[6] H. Zhang, Y. Shen, R. D Soberanis-Mukul, **A. Ghosh**, H. Ding, L. Seenivasan, J. L Porras, Z. Mao, C. Li, W. Xiao, L. Yarmus, A. C. Argento, M. Ishii, M. Unberath, **TwinOR: Photorealistic Digital Twins of Dynamic Operating Rooms for Embodied AI Research**, *arXiv 2025 (under review)* [paper]

[7] H. Zhang, L. Seenivasan, J. L Porras, R. D Soberanis-Mukul, H. Ding, H. Shu, B. D Killeen, **A. Ghosh**, L. Yarmus, M. Ishii, A. C. Argento, M. Unberath, **Did you just see that? Arbitrary view synthesis for egocentric replay of operating room workflows from ambient sensors**, *arXiv 2025 (under review)* [paper]

Relevant Projects

Latent Space Exploration for Generative AI Spring 2024
Interactive Machine Learning Course Project at ETH Zurich [*report* | *poster*]

- Designed an **interactive framework** for exploration and manipulation of the learned representations of a **generative model** trained on textile data.
- Produced 2D projection of **disentangled latent space** along colors to enable user-controlled textile generation.
- Automated the deployment lifecycle by architecting a **CI/CD** pipeline using **Docker containers** to ensure consistent environment parity.

How Much Noise is Too Much Noise? Spring 2024
Computational Semantics for NLP Course Project at ETH Zurich [*code* | *report*]

- Applied reinforcement learning from human feedback **(RLHF)** using **preference optimization techniques** on noisy annotations to enhance the robustness of language models.
- Analyzed the performances of different methods like PPO, DPO and N-Sampling using **reward evaluations** and **KL-divergence** from reference language model.

Leveraging Motion Imitation in Reinforcement Learning for Biped Character Spring 2023
Digital Humans Course Project at ETH Zurich [*code* | *report* | *demo*]

- Implemented an **actor-critic algorithm** that performs **task objectives** like direction control, alongside imitating motions in a physically-based environment.
- Synthesized longer motion sequences by using methods like **multi-clip concatenation** and **composite policy**.
- Proposed a **residual policy network** that can leverage pre-trained agents and retarget to new characters.

Scene Render: Man on Mars Autumn 2022
Computer Graphics Course Project at ETH Zurich [*report*]

- Implemented a **low-level renderer** with **light source functionalities** like environment map emitter and probabilistic progressive photon mapping, and additional post-processing NL-means **denoising**.
- **Enhanced mesh object surfaces** by overlaying image textures, normal mapping, and reproducing Disney's implementation of bidirectional reflectance distribution function.

Technical Skills

Languages: Python, C, C++, Java, Kotlin, SQL, JavaScript
Tools and Frameworks: PyTorch, OpenCV, Blender, Isaac Sim, Unity, 3D Slicer, mySQL, mongoDB

Extracurricular

- **Co-Founder and Technical Head**, Research Society Manipal: administered a student body of 100+ members promoting inter-disciplinary research, mentored students in the field of AI, and hosted academic events like webinars.
- **Volunteer**, Teach Code for Good, Manipal: tutored 20 underprivileged students in secondary school on Computer Science topics and programming languages like Python and C.
- **Writer**, Manipal The Talk Network: published 10+ articles constituting informative features on technology and creative literary pieces at Manipal's largest independent media organization in India.