

# Gyanateet Dutta

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## SUMMARY

Machine Learning Engineer with specialized expertise in 3D computer vision, neural rendering, and AR/VR technologies. Strong background in developing and optimizing ML models for real-world applications, including geometric scene understanding, 3D reconstruction, and neural scene representations. Proven ability to integrate ML solutions into production environments with experience in C++, CUDA optimization, and resource-constrained deployment.

## EDUCATION

**Master of Science, Computer Science & Artificial Intelligence** 2023 – 2024

*University of Leeds, UK*

Specialization: Machine Learning, Computer Graphics, GPU Computing, Video Game Technology

**Bachelor of Technology, Electronics and Computer Science** 2019 – 2023

*Kalinga Institute of Industrial Technology (KIIT), India*

Grade: 8.61/10 (First Class with Distinction)

## PROFESSIONAL EXPERIENCE

**Research and Development Scientist - Science Museum Group** Nov 2023 – Present

- Lead development of computer vision pipelines for 3D reconstruction using Structure-from-Motion (SfM) and Neural Radiance Fields (NeRF)
- Integrated state-of-the-art ML models with Unreal Engine for real-time interactive VR environments
- Optimized neural rendering algorithms using CUDA for 10x performance improvement
- Implemented multi-view 3D reconstruction systems processing 10,000+ images with 95% geometric accuracy
- Applied Swin Transformers for enhanced feature extraction in 3D reconstruction pipelines

**Research Intern - University of Leeds** Mar 2025 – Sep 2025 (Planned)

- Developing real-time computer vision methods for surgical phase detection using Vision Transformers

- Implementing self-supervised learning approaches (DINOv2) for robust visual feature extraction
- Optimizing models for deployment on resource-constrained medical devices

KEY PROJECTS

B3tt3r: Enhanced 3D Reconstruction Framework

- Developed novel 3D reconstruction system combining MAST3R and Spann3r models for improved accuracy
- Implemented efficient scene representation using transformer-based geometric understanding
- Achieved state-of-the-art results in multi-view stereo reconstruction benchmarks

Technologies: PyTorch, CUDA, C++, 3D Computer Vision, Transformers

Neural Scene Representation for VR (Dalton Mills Project)

- Built large-scale photogrammetry pipeline processing 10,000+ images for cultural heritage preservation
- Integrated Neural Radiance Fields with VR for immersive visualization
- Optimized rendering pipeline for real-time performance in VR headsets

Technologies: NeRF, Photogrammetry, VR, Unreal Engine, CUDA

Real-time Surgical Video Prediction System

- Developed hybrid VAE-Transformer architecture for temporal scene understanding
- Achieved 28.13 PSNR at 22 FPS through FP16 optimization and gradient checkpointing
- Reduced model size by 40% while maintaining accuracy through pruning and quantization

Technologies: PyTorch, Transformers, Model Optimization, Computer Vision

TECHNICAL SKILLS

**Languages:** C++ (Proficient), Python (Expert),  
CUDA C++ (Proficient), JavaScript, JAX

**ML/Computer Vision:** Neural Rendering  
(NeRF, Gaussian Splatting), 3D Reconstruction  
(SfM, MAST3R, DUST3R), Geometric  
Computer Vision, SLAM/VIO, Depth Estimation,  
Visual Localization, Semantic Segmentation

**Deep Learning:** PyTorch, TensorFlow, Vision  
Transformers, Model Optimization (Pruning,  
Quantization, Distillation), ONNX, TensorRT

**Tools & Platforms:** CUDA, OpenCV, PCL,  
Eigen, Git, Docker, Linux, AWS, Google Cloud  
(TPUs), Unreal Engine

## PUBLICATIONS

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- **Improved Pothole Detection Using YOLOv7 and ESRGAN** - arXiv:2401.08588 (2024)  
*Enhanced object detection in low-resolution images through super-resolution techniques*
- **Solving The Travelling Salesmen Problem using HNN and HNN-SA algorithms** - arXiv:2202.13746 (2022)  
*Novel neural network approaches for combinatorial optimization problems*

## ACHIEVEMENTS

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- **8th Place** - JAX Diffusers Event, Hugging Face & Google Cloud (2023)
- **Top 15%** - AWS DeepRacer Challenge, AWS Summit
- **100% Score** - Deep Reinforcement Learning Certification, Hugging Face
- **NVIDIA Certified** - CUDA Python: Fundamentals of Accelerated Computing