

Ananth Kalyanasundaram

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RESEARCH INTERESTS

My research interests broadly lie in the field of Computer Vision and Deep Learning with a focus on Video and 3D Scene Generation, 3D Reconstruction and Neural Rendering.

EDUCATION

Technical University of Munich

October 2021 - September 2024

MSc. Informatics

Munich, Germany

GPA: 3.78/4.0

Advisor: Prof. Dr. Matthias Niessner

SRM Institute of Science and Technology

July 2016 - June 2020

B.Tech (Computer Science and Engineering)

Chennai, India

GPA: 3.82/4.0

WORK EXPERIENCE

Virtual Staging AI

April 2024 - July 2024

Applied Research Intern

Munich, Germany

- Developed depth-aware models for furniture removal product based on Stable Diffusion Inpainting which increased quality of the output by 75%.
- Created the pipeline for processing around 200,000 raw images from real-life into a trainable format.

Technical University of Munich

March 2022 - January 2024

Research Assistant

Munich, Germany

- Enhanced autopilot collision detection by 20% using Delaunay triangulation and Graph Neural Networks.
- Annotated 400 scenes for the ScanNet++ dataset.
- Developed meta learning pipelines for the prediction of ground water levels in satellite imagery.

Human Analysis Lab, Michigan State University

September 2020 - October 2021

Research Intern

East Lansing, Michigan, USA

- Achieved 5M (20%) parameter reduction in neural networks for multi-task learning on the CUB dataset, using shared weights within layers, under the supervision of Professor Vishnu Boddeti.

KPMG India

July 2020 - October 2020

Data Analyst Intern

Mumbai, India

- Created automation software for OTP verification in the tax filing process thereby reducing processing time by 10%.
- Increased productivity by 15% by identifying redundant internal processes of the OCR system for the Tax Technology and Transformation team.

SRM Medical College

August 2019 - June 2020

Research Intern

Chennai, India

- Developed a novel loss function for super-resolution which improved SSIM by 0.01 and published a paper on the same at the IEEE EMBC 2020 conference.
- Analyzed, cleaned and preprocessed 1,000 real-life Knee MRI images for training AI models towards biomedical imaging.

Healthcare Technology Innovation Centre(HTIC), IIT-Madras

May 2018 - July 2019

Research Intern

Chennai, India

- Achieved a top 20 position in the leaderboard of segmentation and classification challenges held by ISBI and SPIE Medical Imaging conferences.
- Conducted research using different architectures for the task of Super-resolution on Brain MRI.

PUBLICATIONS

- **MRI Super-resolution using Laplacian Convolutional Neural Networks with Isotropic Undecimated Wavelet Loss.** S.Ramanarayanan, B.Murugesan, **A.Kalyanasundaram**, S.Prabhakaran, S.Patil, M.Sivaprakasam. 42nd Annual International Conference of the IEEE Engineering in Medicine and Biology Society 2020 (EMBC 2020).

PROJECTS

View Consistent Rendering using Neural Textures

We created view consistent attention layers in the ControlNet architecture which leverages the Stable Diffusion model. We also improve consistency further by using NeRFs for temporal smoothening.

ChessLlama

Developed a Llama3.2-based language model trained on chess game data with PyTorch to generate chess moves. Utilized chess game datasets from HuggingFace and integrated evaluation metrics to assess model performance against existing chess engines, such as Stockfish.

Text-DiffScene: Text-driven 3D Scene Synthesis with Permutation Equivariant Graph Diffusion

We propose a novel idea to generate 3D indoor scenes from just sentences using the ScanNet dataset. Diffusion models are used to generate objects and the layout, conditioned on text prompts.

Inverse Rendering by Shape, Light, and Material Decomposition from Images using Monte Carlo Rendering and Denoising

In this project we optimized 3D geometry, lighting and material from multi-view images of an object.

3D Flow Solvers using Physics Informed Deep Learning

Our team worked on creating a dataset consisting of 3D simulations of karman vortices and the consequent vortex shedding. Developed physics informed 3D UNets which predicted the karman vortices in a recurrent fashion, which is 10 times faster than just the physics simulator. Done under Prof. Dr. Nils Thuerey's group.

3D Semantic Reconstruction from a Single RGB Image

The task is to predict 3D meshes of objects with semantic labels from a single RGB image. We propose a novel transform to ensure feature propagation of pretrained 2D models into the 3D space. This project was done as a part of the elite ADL4CV course offered by Prof. Dr. Matthias Niessner's group at TUM .

COURSES

University Courses

- IN2064 Machine Learning
- IN2346 Introduction to Deep Learning
- IN2390 Advanced Deep Learning for Computer Vision : Visual Computing (elite course for the top 20 students.)
- IN2298 Advanced Deep Learning for Physics
- IN2375 Computer Vision III: Detection, Segmentation and Tracking
- IN2354 3D Scanning and Motion Capture

TECHNICAL SKILLS

Proficient in deep learning / machine learning techniques in computer vision and graphics with related programming languages and tools.

Skills:	Machine Learning, Computer Vision, 3D Reconstruction, Large Language Models
Programming Languages:	Python, C++, MATLAB, SQL, Bash
Frameworks:	PyTorch, Keras, OpenCV, OpenGL, HuggingFace, scikit-learn, Pandas, Kivy
Developer Tooling:	Unix, Git, Google Cloud Platform (GCP), Amazon Sagemaker, MongoDB