

# Ananth Kalyanasundaram

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## RESEARCH INTERESTS

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

## EDUCATION

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**Technical University of Munich**

October 2021 - September 2024

*MSc. Informatics*

*Munich, Germany*

Advisor: Prof. Dr. Matthias Niessner

**SRM Institute of Science and Technology**

July 2016 - June 2020

*B.Tech (Computer Science and Engineering)*

*Chennai, India*

## WORK EXPERIENCE

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**Virtual Staging AI**

April 2024 - July 2024

*Applied Research Intern*

*Munich, Germany*

- Developed a new method for furniture removal product based on Stable Diffusion Inpainting models 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**

May 2023 - January 2024

*Research Assistant*

*Munich, Germany*

- Explored meta learning strategies 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*

- Worked on improving the performance of deep neural networks for the purpose of multi task learning under the supervision of Professor Vishnu Boddeti.

**KPMG India**

July 2020 - October 2020

*Data Analyst Intern*

*Mumbai, India*

- Worked on optimizing tax processes after analysis of data for the Tax Technology and Transformation team.
- Created automation software for OTP verification in websites.
- Tested several bots and ensured high quality output was produced.

**SRM Medical College**

August 2019 - June 2020

*Research Intern*

*Chennai, India*

- Analyzed and cleaned real-life Knee MRI data. Used image processing techniques to make the data trainable.
- Developed a novel loss function for this task which delivered better results and published a paper on the same at the IEEE EMBC 2020 conference.

**Healthcare Technology Innovation Centre(HTIC), IIT-Madras**

May 2018 - July 2019

*Research Intern*

*Chennai, India*

- Implemented several state-of-the-art deep learning architectures for the task of Image Segmentation and Classification.
- Achieved a position in the top 20 of the leaderboard at the time of conclusion of challenges held by ISBI and SPIE Medical Imaging conferences.
- Conducted research using different architectures for the task of Super-resolution on Brain MRI.

## PUBLICATIONS

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- 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

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**View Consistent Rendering using Neural Textures**

July 2023 - April 2024

We propose 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.

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

September 2022 - May 2023

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**

September 2022- March 2023

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

## **3D Stereo Reconstruction**

Performed Stereo Reconstruction on the KITTI Stereo 2015 dataset. Implemented Block Matching, Semi Global Matching for generating disparity maps and also used SIFT, SURF, ORB for keypoint matching, triangulation and generation of point clouds.

## **3D Semantic Reconstruction from a Single RGB Image**

May 2022 - August 2022

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**

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### **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**

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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

### **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