

# Neeraj Panse

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## Education

### Carnegie Mellon University, Robotics Institute

Master of Science in Computer Vision - GPA: 4.0/4.0

August 2022 – Present

Pittsburgh, USA

**Coursework:** Visual Learning and Recognition, Learning for 3D, Computer Vision, Machine Learning, Robot Learning, Geomotry Based Vision, Computational Photography

## Experience

### Airlab, CMU | Research Collaborator advised by Prof. Sebastian Scherer

January 2023 - Present

- Working on **Real-Time Multi-layer Semantic 3D Mapping** of indoor environments using images and lidar point clouds.
- Built strong baselines using lightweight **2D and 3D instance segmentation** architectures such as **RangeNet++** and **SOLOv2**.
- Investigating the use of pillar encoder networks such as **PointPillars** and **PiFeNet** for **3D object detection** in indoor settings.
- Exploring knowledge distillation techniques from RGB Images for lidar-only 3D perception.

### Zillow Group | Machine Learning Engineering Intern

May 2023 - August 2023

- Worked in the **AI Photography** team of Zillow's **Rich Media Experience** org. to create **on-device, real-time, 3D floor plans** from panoramic images for better visual user experiences
- Improved top down room shape representations from individual panoramas through efficient inference pipelines in **C++**
- Developed an algorithm that eliminated **96% of undesired overlaps** in room shapes by merging upstream panoramic representations, leading to highly interpretable and interactive 3D floor plans.

### Language Technologies Institute, CMU | Teaching Assistant

January 2023 - Present

- **11634 - Capstone Planning** : Mentored and graded Masters in Data Science students in planning capstone projects.
- **11603 - Python for Data Science** : Mentored students in a course for python used specifically for data science.
- **11632 - Data Science Capstone** : Mentoring and graded Masters in Data Science students in executing capstone projects.

### Adagrad AI | Research Scientist, Computer Vision

August 2020 - June 2022

- Led the product R&D of an **edge based Boom Barrier Automation system** using **Number Plate Recognition**.
- Developed data collection, training and deployment pipelines for lightweight object detection models: **Yolo-X** and **Yolo-v4**.
- Achieved accuracy of **97%** for four-wheelers and **95%** for two-wheelers with **50 fps throughput** on Nvidia Jetson-TX2
- Built real-time video pipelines in C++ using **DeepStream-TensorRT**. **Deployed at 50+ sites for access control and analytics**.
- Designed online analytics, inference and monitoring services using **Django, Kafka, Celery, Redis, Nvidia Triton and DALI**.

### Fynd Pvt. Ltd. | Research Intern, Computer Vision

May 2020 – August 2020

- Tackled the task of **Image Matting** for Fynd's AI platform, **eraseBG** by building production level segmentation models.
- Investigated the use of generative AI techniques such as **Self Attention GANs** for high fidelity image matting.

## Publications/Projects

### S2RF: Semantic Stylizing Neural Radiance Fields | Project Page |

March 2023 - May 2023

- **Paper Publication** – Neeraj P., Moneish K., & Dishani L., "S2RF: Semantically Stylized Radiance Fields.", **ICCV 2023 workshop on AI for 3D Content Creation. Paris, France**
- Built techniques to transfer custom styles to custom objects and also maintain 3D consistency in neural 3D reconstructions.
- Designed style transfer methods by combining the **NNFM loss** and object masks from SOTA models (DETR, Segment Anything). Made use of **Plenoxels** to optimize radiance fields and get high quality and efficient 3D rendering.

### Computer Vision Based Offside Detection In Soccer | Paper | Code |

January 2020 - August 2020

- **Paper Publication** – Neeraj P. & Ameya M., "A Dataset & Methodology for Computer Vision based Offside Detection in Soccer.", **2020 ACM Multimedia, Multimedia Content Analysis in Sports (MMSports), Seattle, Washington**.
- Improved major drawbacks of current, real-world soccer offside decision-making by developing a Computer Vision and Image Processing based pipeline for providing accurate, fast, and explainable offside decisions.

### Cervical Cancer Detection | Sponsored By: Periwinkle Technologies Pvt. Ltd.

August 2019 - May 2020

- Collaborated in a team of four in building robust Cervical Cancer detection models to reduce the cost required in the manual process. Designed **Multimodal Networks** using a combination of cervix images and the patient's demographic information.
- Built robust feature extraction models using **Deep Metric learning and AutoEncoders** to leverage large unlabeled data.

## Technical Skills

**Programming Languages:** Python C C++ SQL | **Relevant Frameworks:** Pytorch DeepStream GStreamer TensorRT OpenCV CUDA TensorFlow Keras ONNX Docker Django Flask Kafka Celery CMake Git