Sanil **Pande**

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Education

Carnegie Mellon University - School of Computer Science — *Pittsburgh, PA*

Master of Science in Robotic Systems Development — *May 2021*

QPA: **4.25/4.33**

Coursework: Visual Learning & Recognition*, Robot Autonomy*, Computer Vision, Manipulation Estimation & Control

Vellore Institute of Technology — *Vellore, India*

Bachelor of Technology in Mechanical Engineering — *April 2019*

CGPA: **9.16/10.00**

Projects

Docking, Navigation and Safety Behavior for an Autonomous Vehicle — *Jan '20 - Present*

CMU MRSD Capstone Project - Sponsored by **PIX Moving** | **Website**

- Developing behaviours for an autonomous vehicle intended to dock with modular pods, and integrating into Autoware.
- Mapped indoors using a Velodyne lidar and simulated localization in Autoware using the point cloud data.
- Implemented ROS nodes to detect Apriltags and measure relative pose to facilitate docking in simulation.
- Working on using single-shot networks for obstacle detection & classification to facilitate safe navigation.

Online Low-Shot Learning — *Feb '20 - Present*

CMU - Visual Learning & Recognition Project

- Working to incorporate low-shot learning of new faces, while maintaining accuracy on previously learned data.
- Used an implementation of cascaded neural networks to crop and align faces from the VGGFace2 dataset.

Weakly Supervised Object Localization — *March '20*

- Trained a fully convolutional network to perform localization using image level annotations, and visualized heatmaps.
- Defined and trained a weakly supervised deep detection network based on the AlexNet architecture.

Object Classification with Pytorch — *February '20*

- Defined and trained CaffeNet and ResNet-18 architectures for classification on the PASCAL-VOC 2007 dataset.
- Finetuned a pre-trained Resnet-18 model and incorporated mixup for data augmentation.
- Monitored training performance using TensorBoard and analyzed the feature embeddings using KNN and t-SNE visualization.

Quadcopter Control — *Sep '19 - Nov '19*

- Designed a state machine for a quadcopter and implemented PID and LQR feedback control.
- Simulated by generating time-parametrized, piecewise-continuous constrained trajectories.

Optical Character Recognition and Style Transfer — *November '19*

- Developed OCR pipeline to recognize handwritten alphabets and spatial information such as spaces and new lines.
- Implemented a convolutional network in Pytorch and consistently obtained an accuracy of >90% using OCR on test images.
- Performed image style transfer on a video sequence using Pytorch and OpenCV.

Measurement of Spindle Error in a Lathe using Laser Spot Detection and Tracking — *Dec '18 - April '19*

VIT - Bachelor's Thesis | Presented at CPIE '19

- Detected a projected laser spot using morphological operations.
- Calculated synchronous and asynchronous spindle error using Fourier Series curve fitting.
- Measured spindle radial error using tracking algorithms in OpenCV.

Skills

Programming C++, Python, MATLAB

Tools Pytorch, Robot Operating System (ROS), Autoware, OpenCV, Git, AWS, SolidWorks

Experience

Treknocom Engineering — *Pune, India*

Engineering Design Intern — *May 2018 - June 2018*

- Utilized SolidWorks for surface modelling of fixtures, piping and sheet modelling.
- Generated CNC toolpaths for roughing, semi and finishing using WorkNC.

JCB India — *Pune, India*

Design Intern — *June 2017*

- Worked on the design of Backhoe Loader models using Siemens NX.
- Contributed to part optimization by collecting part data for standardization.

*Currently in progress.