ADITYA WAGH

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Machine Learning Engineer

EDUCATION

New York University   **New York City, NY**
MS in Electrical Engineering (Robotics); GPA: 3.5/4   *Sep 2021 – May 2023*
Coursework: Robot Perception, Robot Localisation, Deep Learning, High Performance Machine Learning, Foundations of Robotics, Probabilility & Stochastic Processes

Birla Institute of Technology and Science (BITS), Pilani   **Pilani, India**
B.Eng in Electronics Engineering   *Aug 2015 – May 2019*

EXPERIENCE

AI4CE Lab at New York University   **New York City, NY**
Graduate Research Asistant   *Sep 2022 – Present*
- Developing new techniques to improve **pair-wise registration of LiDAR point cloud with a low overlap ratio**; Experimented with **outlier rejection** techniques to find the low overlapping region.
- **Teaching Assistant** for ROB-GY 6203 Robot Perception – a graduate level course on 3D Computer Vision.

Central Electronics Engineering Research Institute   **Pilani, India**
Deep Learning Intern   *Jul 2018 – Dec 2018*
- Fine-tuned a Mask-RCNN model for instance segmentation of power cables on this new dataset and achieved a test accuracy of approximately 70%
- Contributed to the pixel wise ground truth annotation of a novel data set consisting of 6000+ Infrared and RGB aerial images of power cables

PROJECTS

- **Post-Earthquake Damage Assessment using Fully Convolutional Networks**   Tensorflow, Keras · [O]
  - Designed fully convolutional networks for multi-task semantic segmentation of building components and their damage state using a shared backbone
  - Utilized batch normalization layers to enable faster convergence and better generalization over real data since the data used for the project was synthetically generated using physics based graphical models
  - Achieved a mAP of 97% over 5 component classes and mAP of 70% for 5 damage state classes
- **Visual Place Recognition using Bag of Visual Words**   OpenCV, Sklearn · [O]
  - Computed SIFT features for each image in database and queries using OpenCV's built-in SIFT feature extractor
  - Employed the k-means clustering algorithm to compute 800 cluster centroids to be used as visual words to generate a histogram of visual words in each image
  - Computed histograms of visual words for all the query images and database images and extracted similar images from the database by using the k-nearest neighbours algorithm on the generated histograms
- **Two-View Geometry based Relative Pose Estimation**   OpenCV · [O]
  - Calibrated a camera using a calibration rig and removed radial distortion from the input images using the obtained camera matrix and distortion coefficient
  - Computed the fundamental matrix using the normalized 8 point algorithm and obtained the essential matrix using the fundamental matrix and camera matrix
  - Decomposed the essential matrix to obtain the orientation and translation vectors between the images
- **Marker based Augmented Reality**   OpenCV · [O]
  - Obtained interest points to compute the epipolar geometry by detecting the corners of an AprilTag fiducial marker
  - Solved a PnP problem to compute 3D to 2D correspondence between the marker corners and face of a cube in 3D space
  - Projected 8 corners of the cube on the image and constructed an AR cube by joining the points
- **Deep Image Matching using Local Feature Trasformers**   OpenCV · [O]
  - Computed SIFT features for each image in database and queries using OpenCV's built-in SIFT feature extractor
  - Employed the k-means clustering algorithm to compute 800 cluster centroids to be used as visual words to generate a histogram of visual words in each image
  - Computed histograms of visual words for all the query images and database images and extracted similar images from the database by using the k-nearest neighbours algorithm on the generated histograms
- **State Estimation of a Quadrotor using On-board Camera and IMU**   MATLAB · [O]
  - Computed SIFT features for each image in database and queries using OpenCV's built-in SIFT feature extractor
  - Employed the k-means clustering algorithm to compute 800 cluster centroids to be used as visual words to generate a histogram of visual words in each image
  - Computed histograms of visual words for all the query images and database images and extracted similar images from the database by using the k-nearest neighbours algorithm on the generated histograms
- **Kinematic and Dynamic Control of a KUKA Manipulator**   Meshcat, Pinnochio · [O]
  - Designed a robot controller for the KUKA 7-joint manipulator
  - Computed the forward and inverse kinematic and dynamic parameters of the manipulator
  - Designed and compared a PID Controller, Resolved Rate Controller and an Impedance Controller for the manipulator
- **Smart Pet Feeder**   PBASIC · [O]
  - Developed a smart bluetooth operated automatic feeder with an accompanying android app
  - Designed an android app to control 3 features of the feeder – drop food, disable feeder and reset food drop count.
  - Employed a HC-06 bluetooth module to connect a BASIC Stamp micro-controller to to the mobile app
  - Designed and 3D printed CAD models of the chasis of the feeder

TECHNICAL SKILLS

- **Languages & Frameworks**: Python, C/C++, Bash, MATLAB, SQL, CUDA, Rust, HTML, CSS, PyTorch, Keras, TensorFlow, OpenCV, Open3D, Scikit-learn, Pandas, NumPy

- **Tools & Platforms**: VSCode, Vim, CMake, Ninja, Git, GitHub, Docker, SLURM, Linux, MacOS, Windows

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