

Aditya Wagh

Website: <http://adityamwagh.me>

Email: adityamwagh@gmail.com

Mobile: +1-929-424-1931

EDUCATION

- **New York University** **New York City, NY**
Master of Science in Mechatronics and Robotics; GPA: 3.667/4 Sep. 2021 – May. 2023
- **Birla Institute of Technology and Science, Pilani** **Pilani, India**
Bachelor of Engineering in Electronics and Instrumentation Aug. 2015 – May. 2019

EXPERIENCE

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

TECHNICAL SKILLS

- **Languages:** Python, C++, Bash, MATLAB, \LaTeX
- **Frameworks:** PyTorch, Keras, TensorFlow, OpenCV, Open3D
- **Tools:** VSCode, Vim, Git, GitHub, GitHub Actions, Docker
- **Operating Systems:** Linux, MacOS, Windows

RELEVANT COURSEWORK

- **Robot Perception:** Projective Geometry, Camera Calibration, Sfm, Optical Flow, Tracking, Basic Deep Learning. (fall 2021)
- **Robot Localisation and Navigation:** Bayes Filter, Kalman Filter, Pose Estimation, Motion Field, Slam, EKF & Pose Graph Slam. (spring 2022)
- **Deep Learning:** Convolutional Neural Networks, Recurrent Neural Networks, Transformers, Generative Adversarial Networks, Deep Reinforcement Learning, Self-Supervised Learning (spring 2022)
- **Mechatronics:** Basic Electronics, Actuators, Sensors, Interfacing, Micro-Controller Programming (fall 2021)
- **Foundations of Robotics:** Kinematics, Inverse Kinematics, Dynamics, PID, Resolved Rate and Impedance Control. (fall 2021)
- **MOOCs:** Neural Networks & Deep Learning, Mathematics for Machine Learning, Convolutional Neural Networks in Tensorflow, Introduction to Tensorflow

PROJECTS

- **Fully Convolutional Networks for Post-Earthquake Damage Assessment:**
 - **About:** A FCN for semantic segmentation of components of a damaged building, another FCN for semantic segmentation of extent of damage.
 - **Model:** Designed two networks with a symmetric encoder and decoder, one to classify building components and another to detect damaged components.
 - **Metrics:** Achieved a mean IoU of 83% over 5 component classes and mean IoU of 70% for 5 damage states.
- **Variable Computation in Recurrent Neural Networks:**
 - **About:** A NumPy implementation of the paper [arxiv:1611.06188](https://arxiv.org/abs/1611.06188)
 - **Model:** Implemented a learnable scheduler which varies the amount of computation based on data provided to the neural network.
 - **Metrics:** Achieved a 50% reduction in the number of computation for text data.
- **Kinematic and Dynamic Control of a KUKA Manipulator:**
 - **About:** A robot controller for the KUKA 7-joint manipulator.
 - **Kinematics & Dynamics:** Developed the forward and inverse kinematic and dynamic model of the manipulator.
 - **Controller:** Designed and compared a PID Controller, Resolved Rate Controller and an Impedance Controller for the manipulator.
- **Smart Pet Feeder:**
 - **About:** A bluetooth operated automatic feeder with an accompanying android app.
 - **App:** Designed an android app to control 3 features of the feeder - drop food, disable feeder and reset food drop count.
 - **Interfacing:** Employed a HC-06 bluetooth module to connect a BASIC Stamp micro-controller to the mobile app.
 - **Chassis Design:** Designed and 3D printed CAD models of the chassis of the feeder.
- **Marker based Augmented Reality:**
 - **About:** A near perfect 3D cube drawn on the image of an AprilTag marker.
 - **Marker Detection:** Detected an AprilTag marker and computed corresponding corners, centers and homography of the marker.
 - **Perspective Transformation:** Solved a PnP transform between the corners of a marker and a face of a cube.

- **Cube Construction:** Projected 8 point of the cube on the image and drew lines using OpenCV
- **Camera Calibration And Relative Pose Estimation:**
 - **About:** Calibrate a camera using a calibration rig and estimate pose between two images
 - **Camera Calibration:** Calibrated a camera using April Tag based calibration rig. Got the Camera matrix and distortion parameters.
 - **Fundamental Matrix Estimation:** Removed distortion from the images and computed the fundamental matrix using the normalised 8 point algorithm.
 - **Pose Estimation:** estimated the relative pose between two images by decomposing essential matrix.
- **Bag of Visual Words for finding similar images:**
 - **About:** Calibrate a camera using a calibration rig and estimate pose between two images
 - **Camera Calibration:** Calibrated a camera using April Tag based calibration rig. Got the Camera matrix and distortion parameters.
 - **Fundamental Matrix Estimation:** Removed distortion from the images and computed the fundamental matrix using the normalised 8 point algorithm.
 - **Pose Estimation:** Estimated the relative pose between two images by decomposing essential matrix.
- **Tango+:**
 - **About:** A Tango inspired color scheme for Visual Studio Code.
 - **Metrics:** Attracted 850+ downloads on the Visual Studio Marketplace
- **Clean Portfolio:**
 - **About:** A portfolio page theme for the Jekyll static site generator.
- **Ray Tracer:** A bare bones C++ implementation of a ray tracer.
 - **Data Annotation:** Contributed to the pixel wise annotation of a novel data set consisting of 6000+ Infrared and RGB aerial images of power cables.
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