

BALAJI PRANEETH BOGA

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Education

Carnegie Mellon University, GPA: 3.82/4.0

Aug 22 – Dec 23

Masters of Science in Mechanical Engineering: Robotics and Controls

Pittsburgh, PA

Relevant Coursework

- Visual Learning and Recognition
- Advanced Controls Systems Integration
- Computer Vision
- Art and Machine Learning
- ML and AI for Engineers
- Bio-inspired Robot Design

Experience

Biorobotics Lab - Robotics Institute, CMU

May 23 – Sept 23

Graduate Research Assistant - Advised by Dr. Matthew Travers and Dr. Howie Choset

Pittsburgh, PA

- Employed advanced deep learning frameworks like Mask RCNN, Fast RCNN, FCOS and YOLO to detect screws in a given open device with an overall **accuracy of 95%**
- Worked under the guidance of Dr. Matthew Travers and Dr. Howie Choset, on an **end-to-end vision-based auto e-waste recycling** project in collaboration with one of the major mobile companies of the world
- Designed and deployed robust and novel min-max based **point cloud matching** algorithms to improve efficiency of **screw-mask calibration** by **90%**, speeding up the screw punching process via the overhead camera on the punch station by **97%**
- Developed and deployed a robust methodology of **object tracking** to precisely improve the **tracking efficiency** by **40%**, thereby enabling seamless localization of screws through the left and right plate cameras

Skills: *Deep Learning, Robotics, Computer Vision, Object Detection, Instance Segmentation, Object Tracking, Camera Calibration, 3D Image Warping, Visual SLAM*

Tech Stack: Python, Linux, AWS(EC2), Docker, OpenCV, Pandas, NumPy, PyTorch, ROS, Git, Google Cloud

Projects

SOTA Object Detection on Synthetics | *Deep Learning, Data Generation, Data Analysis*

Aug 23 – Dec 23

- Developed an end-to-end data generation pipeline to synthesize a dataset of **19000** indoor images with synthetic poster objects placed in the images using Greedy Placement and 3D Image Warping
- Designed a novel **iou-based** evaluation metric named **"Robustness score"** to compare the performance of Object Detection on the dataset before and after inclusion of the objects using 5 different OD models (namely FasterRCNN, SSD, RetinaNet, FCOS and YOLO)
- Finetuned each model using hyperparameters like confidence and nms thresholds with resulting best Robustness scores of **1.0** for YOLO, **0.98** for FCOS

Tech Stack: Python, Linux, AWS(EC2), PIL, OpenCV, Pandas, NumPy, PyTorch, Git, Google Cloud

One-Shot 3D Learning | *Deep Learning, Computer Vision, Hyperparameter Tuning, Data Analysis*

Jan 23 – May 23

- Designed Deep Neural Networks like **FCOS** and **YOLO** to classify 10 classes of objects like bed, sofa, chair, etc. using the polygonal mesh data
- Optimized and fine-tuned each hyperparameter to obtain an overall **mAP of 25%**

Tech Stack: Python, Tensorflow, Keras, PIL, OpenCV, Pandas, NumPy, PyTorch, Git, Google Cloud

Disease Classification using ML | *Feature Engineering, Data Preprocessing, Visualization*

Aug 22 – Dec 22

- Identified diseases using a data of **133** features such as cold, fever, itch, etc. from a total of **4920** patients
- Compared different algorithms in terms of efficiency such as KNN, Random Forest Classifier, Support Vector Machine, Gradient Boosting and Decision Tree
- Improved performance of each model by **4-5%** using feature engineering and Hyperparameter tuning

Tech Stack: Python, Sci-kit, Tensorflow, Pandas, NumPy, Matplotlib, Seaborn, GridSearchCV, Git, Google Cloud

Technical Skills

Languages: Python (Scikit, OpenCV, TensorFlow, PyTorch, Numpy, Pandas, PySpark), MATLAB, C/C++

Tools/Frameworks: AWS, Linux, Github, VS Code, Eclipse, ROS, Google Cloud Platform

Leadership / Extracurricular

Volunteer, MechE DEI, Pittsburgh, PA

Aug 2022 – Present

Volunteer, World Wide Fund for Nature, Hyderabad, India

Aug 2021 – Present