

# Barathwaj Anandan

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## Education

### Carnegie Mellon University - School of Computer Science

Pittsburgh, PA

#### MASTER OF SCIENCE IN ROBOTIC SYSTEMS DEVELOPMENT

August 2019 - May 2021

**Coursework:** Computer Vision, Machine Learning, Geometry Vision, Computer Graphics, Visual Recognition

### PSG College of Technology

Coimbatore, India

#### BACHELOR OF ENGINEERING IN ROBOTICS AND AUTOMATION

June 2018

**Coursework:** Neural Networks, Vision Systems and Image Processing, Artificial Intelligence for Robotics, C++ and Data Structures

## Skills

**Programming** Python, C++, Bash

**Tools** Git, Bokeh, SLURM, Docker, AWS, solidworks, jupyter

**Deep Learning Libraries** Pytorch, Numpy, Beautiful Soup, mmdetection, wandb, langchain, Ollama, crewAI,

## Experience

### Lucid Motors

Newark, CA

#### ADAS/AD - PERCEPTION SOFTWARE ENGINEER

November 2021 - Present

- Spearheaded end-to-end Traffic Light Detection project, driving innovation from data annotation guidelines, model development, evaluation to deployment. Collaborated cross-functionally to preprocess and integrate data, select optimal model architecture, and train them. Achieved baseline performance of 95%+ mAP.
- Worked on the data pipeline, training, validation and deployment with sparse and dense query paradigms for BEV-based 3D object detection models. Trained and tested several models achieving more than 20% improvement in detection accuracy over current production models with 30% faster inference.
- Designed an interactive Python/Bokeh dashboard providing enhanced visibility into GPU server utilization and reservations for our local cluster, enabling robust tracking of usage history.
- Designed and built Lucid's Machine Learning framework to enable scalable distributed training, for quicker iteration, unifying SLURM, WANDB, Microsoft Teams to enable automated parallel runs across GPU clusters, optimizing for productivity.
- Integrated and maintained camera deployment pipeline into Lucid Dream Drive. Identified bottlenecks and optimized performance.
- Reduced the launch time of Lucid AV Stack by 3x to < 60 seconds by identifying bottlenecks in the launch sequence.
- Saved the team thousands of hours by developing and maintaining a HIL bench setup with hardware connections and software APIs for efficient testing and evaluation of perception system.
- Developed an automated report generation framework to streamline smoke testing for perception modules, implementing pipelines for automated image creation, executing validation tests, plotting results, collecting comprehensive logs etc

### Carnegie Mellon University - Cylab

Pittsburgh, PA

#### RESEARCH ASSISTANT

January 2021 - June 2021

- Worked on object detection using multiple cameras placed around the Autonomous Vehicle.
- Used Jetson Xavier to stream and transfer videos from multiple cameras.
- Built a python - C++ wrapper for communication between data stream from cameras and object detector.

### IntelinAir, Makers of AgMRI

Champaign, IL

#### COMPUTER VISION ENGINEER (INTERN) - PUBLISHED PAPER LINK

May 2020 - August 2020

- Built an efficient object detection model based on Faster RCNN for counting the number of kernels on a corncob.
- Developed an instance segmentation pipeline based on Mask RCNN to determine the quality of individual kernels.
- Achieved a kernel count accuracy of 93%.

### Carnegie Mellon University - Cylab | General Motors

Pittsburgh, PA

#### SHORT TERM SCHOLAR

Jan 2018 - April 2019

- Built a robust simulator based on OGRE 3D Engine using C++, simulating different sensors like camera.
- Implemented algorithms to simulate the effects of weather conditions, traffic signals and pedestrian on ego vehicle.

## Selected Projects

### Applied LLM Personal Project - Custom Voice Assistant |

January 2024 - Present

- Built a Local LLM based personalized home assistant to replace Siri to control home smart devices. Designed and wrote Python wrappers for REST APIs from Govee and Samsung. Used function calling and AI agents to control the connected devices. Used tools like langchain, Ollama, crewAI, whisper to perform the tasks at hand.
- Currently working on a personal budgeting tool using local VLMs.
- Built an LLM powered RAG based movie suggestion tool that suggests movies based on Natural Language queries. Built on streamlit using Llama-70B and Milvus DB.
- Developed an automated content creation pipeline that produces a shorts video from any given youtube video as input. Based on Whisper, VoiceCraft, moviepy and Sonar-10B.

### Apartment Package Delivery with UAV | CMU-Capstone | Website

January - December 2020

- Built a drone to deliver packages to apartment balconies autonomously.
- Implemented a real time obstacle detection system based on YOLOv3, trained using custom dataset with an accuracy of 99%.