Vikas Nataraja

Boulder, CO | (781)392-9336

✉ **hnvikas14@gmail.com** | 🔗 **LinkedIn** | **Github** | 🌐**Website** | 🪐 **Blog**

EDUCATION

Master of Science, Electrical and Computer Engineering   *May 2020*
University of Colorado, Boulder   *GPA - 3.51/4.0*
Bachelor of Engineering, Electrical & Telecommunication Engineering   *June 2018*
Visvesvaraya Technological University, India   *GPA - 3.6/4.0*

WORK EXPERIENCE

Professional Research Assistant at LASP - *Boulder, CO*   ***December 2019 - Present***
- Researching ML and currently building a convolutional neural network based on UNet in Keras to retrieve 3D cloud optical thickness from cloud images and funded by NASA ORACLES mission.
- Achieved an 88% decrease in training time with 0.87 mean IoU and **publishing a paper** highlighting the work behind data masking, neural network optimizations, and architecture advances.

Software Engineering Intern at Allvision IO - *Pittsburgh, PA*   ***Summer 2019***
- Developed convolutional neural network models with AWS EC2 instances in Linux using TensorFlow for detection and recognition of license plates on the streets of Pittsburgh using RGB camera data.
- Achieved an AP score of 0.78 using Faster R-CNN and 0.69 using SSD, both performed using transfer learning and evaluated on COCO detection metrics using AWS S3 for model storage.

Software Engineer at Maxwell CubeSat Satellite - *Boulder, CO*   ***September 2018 – May 2020***
- Designed software drivers for sensors in C and C++ in Linux for attitude determination of satellite to achieve pointing knowledge within ±2° and pointing accuracy within ±10°.
- Developed code for reaction wheel controls with virtual machines (VMs), upgraded legacy code to coding standards, and aided team with version control and documentation support.

ACADEMIC PROJECTS

TAMER-ER: Augmenting TAMER with Expression Recognition - *CU Boulder*   ***Spring 2020***
- Developed a model using Reinforcement Learning with Variational AutoEncoder (VAE) to augment facial expressions to TAMER to enhance agent belief and improve experience recall.
- Achieved on-par performance with TAMER and fine-tuned facial classification performance using encoder-decoder (unsupervised learning) models in OpenAI Gym environments.
- *Tools/Technology Used:* Python, dlib, Pandas, TensorFlow/Keras, Git, OpenAI Gym

Fully Autonomous RC-sized Vehicle - *CU Boulder*   ***Fall 2019***
- Developed an autonomous vehicle where I worked on LiDAR and camera-driven perception as well as motion planning optimization using "Follow-the-Gap" path planning algorithm.
- Designed perception algorithms using 2D RPLiDAR and RealSense cameras for vision and depth perception on an Nvidia TX2 GPU using ROS with OpenCV.
- *Tools/Technology Used:* Python (OpenCV), C++, TensorFlow/Keras, ROS, CUDA, Git

AV Lane Switching using Monocular RGB Camera Data - *CU Boulder*   ***Spring 2019***
- Developed a convolutional neural network model using UC Berkeley DeepDrive dataset in Python to enable autonomous vehicle decisions including lane switching using camera (RGB) data only.
- Created and experimented with Decision Trees, Random Forests, Logistic Regression, and Gradient Boosting and Bagging machine learning models to establish a baseline of 82% accuracy.
- *Tools/Technology Used:* Python (Scikit-Learn, OpenCV), Pandas, TensorFlow, Git

Pedestrian Detection and Tracking for Autonomous Vehicles - *CU Boulder*   ***Spring 2019***
- Developed object tracking algorithms to detect and follow pedestrian movement across a steady video stream from a camera of an autonomous vehicle.
- Designed a Histogram of Oriented Gradients with contour matching model for human detection and Kalman Filter for tracking using Python to find and predict pedestrian movement in a video stream.
- *Tools/Technology Used:* Python (OpenCV, HOG), MATLAB (Computer Vision System Toolbox), Git

PUBLICATIONS

1. Aaron P. Aboaf et al. A Methodology for Successful University Graduate CubeSat Programs. *Smallsat 2020.*
2. **Vikas H. Nataraja**, Hong Chen and Sebastian K. Schmidt. Cloud Optical Thickness Retrieval using Deep Neural Network Segmentation based on 3D Radiative Transfer. 2021.* *(in progress)*