

# VIKAS NATARAJA

Machine Learning Researcher/Engineer

## EDUCATION

2018 - 2020 • University of Colorado  
Boulder, CO • Master of Science • Electrical  
and Computer Science

2014 - 2018 • Visvesvaraya Technological  
University, India • Bachelor of Engineering •  
Telecommunication Engineering

## SKILLS

**Programming:** Python, C, C++, MATLAB

**OS & Platforms:** Linux (Bash), Git, AWS,  
GCP, ROS, CUDA

**Libraries:** Tensorflow, Keras, PyTorch,  
OpenCV, Scikit-Learn

**Publications:** [CubeSat paper](#), Cloud paper\*

## EXPERIENCE

Dec 2019 -

Present

**Laboratory for Atmospheric and Space Physics - Boulder, CO**

*Professional Research Assistant*

- Researching ML and currently building a convolutional neural network (CNN) based on UNet in Keras to retrieve 3D cloud optical thickness from satellite cloud imagery.
- Created novel evaluation metrics and achieved an 88% decrease in training time with 0.87 mean IoU. **Publishing a paper** highlighting the work done by our team of 6.

May - Aug 2019

**Allvision IO - Pittsburgh, PA**

*Software Engineering Intern*

- Developed CNNs for a 15-person startup with AWS EC2 and S3 instances in Linux using TensorFlow for detection and recognition of license plates in real-life RGB camera data.
- Achieved an AP score of 0.78 using Faster R-CNN and 0.69 using Single Shot Detector, using transfer learning, and evaluated using COCO detection metrics.

Sept 2018 - May  
2020

**MAXWELL CubeSat - Boulder, CO**

*Software Engineer*

- Designed software drivers for sensors in C and C++ in Linux for attitude determination of satellite to achieve pointing knowledge within  $\pm 2^\circ$  and pointing accuracy within  $\pm 10^\circ$ .
- Upgraded legacy code for reaction wheel controls with virtual machines (VMs), established coding standards, and aided team with Git and documentation support.

## PROJECTS

Spring 2020

**TAMER-ER: Augmenting TAMER with Expression Recognition** [Code](#) [Paper](#)

- Worked with a team of 5 to augment facial expressions to TAMER using Reinforcement Learning with Variational AutoEncoder (VAE).
- Achieved on-par performance with TAMER; fine-tuned facial classification performance using encoder-decoder (unsupervised learning) models in OpenAI Gym environments.

Fall 2019

**Fully Autonomous RC-sized Vehicle** [Code](#)

- Developed an autonomous vehicle where I worked on LiDAR and camera-driven perception and motion planning optimization as a team of 4.
- Designed perception algorithms using 2D RPLiDAR and RealSense cameras for vision and depth perception on an Nvidia TX2 GPU using ROS with OpenCV.

Spring 2019

**AV Lane Switching using Monocular RGB Camera Data** [Code](#)

- Trained a CNN on UC Berkeley DeepDrive dataset in Python to enable AV lane switching decisions using camera (RGB) data.
- Created and experimented with Decision Trees, Random Forests, Logistic Regression, and Gradient Boosting and Bagging machine learning models to achieve 82% accuracy.