# KARTIK MADHIRA

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## EXPERIENCE

**Research Assistant**, RAAS Lab, University of Maryland *Sep 2019 - Present*
- Currently working on deploying end-to-end perception pipeline for UAV based autonomous bridge infrastructure inspection. The sensor module includes a 3D Lidar (VLP-16), Monocular Camera and IMU.
- Perception pipeline involves semantic understanding of the environment of the infrastructure using Lidar and Camera and catering as the input to the planning pipeline.

**Perception Intern**, Aeva Inc., Mountain View *May 2019 - Aug 2019*
- Quantifying object tracking and detection in the perception pipeline - Implemented and integrated end to end metrics to set benchmarks for tracker and classifier improvements.
- The metrics helped in improving the tracker for highway scene, acting as a feedback in the perception pipeline.

**Research Assistant**, Computer Vision Lab, University of Maryland *Aug 2018 - Apr 2019*
- Implementation and testing of traditional as well supervised deep learning model for optical flow implementation on a downward-facing camera on a drone.
- Deep learning models specifically tested with edge compute devices such as Neural Compute Stick (NCS)

**Trainee Data Engineer**, Mu Sigma Inc., India *Jun 2017 - May 2018*
- Implemented ARIMA forecasting models for predictions of monthly and yearly sales using past inventory data. The client was an E-commerce major in the US specializing in footwear.

**Computer Vision Intern**, TethrBox Technologies *May 2016 - Jul 2016*
- Built static people counter solution for overhead downward-facing cameras. The counter used background subtraction and hungarian algorithm with euclidean distance for data association. Achieved 78% accuracy for the counter.

## PROJECTS

**Collision Avoidance (CAS) using Lidar and Camera fusion**
- Implemented Time To Collision (TTC) pipeline in a perception stack by fusing information from the lidar and camera.

**Structure from Motion (SfM)**
- A 3D reconstruction of a scene from a set of several snaps from a Quadrotor flying over a mat of AprilTags.

**Supervised and Unsupervised HomographyNet**
- Implementation of supervised and unsupervised deep learning approaches in estimating planar homography on TensorFlow. The trained network was used to create a panorama.

**Human Detection Module - Software Development Project**
- Followed Agile Iterative Process (AIP) with Unit Testing and pair-programming to write a software package in C++ (using OpenCV) to detect humans. Used Google Test framework.

**SnapCut/Rotobrush**
- Implemented Adobe After Effects segmentation pipeline SnapCut, a robust video object cutout using localized classifiers.

## EDUCATION

**Master of Engineering**, Robotics *Aug 2018 - May 2020*
University of Maryland **GPA: 3.96**
**Bachelors in Technology**, Instrumentation and Control Engineering *Jul 2013 - Aug 2017*
Nirma University **GPA: 3.8**

## SKILLS

**Computer Vision:** Visual Odometry, Object Segmentation, Object Detection, Visual SLAM, Structure from Motion (SfM), camera calibration, 3D Computer Vision, Image Processing
**Lidar & Radar:** Point Cloud Processing, Lidar-Camera calibration, Semantic Mapping, Sensor Fusion, Radar based tracking
**Softwares/Libraries:** OpenCV, TensorFlow, PCL, Keras, Boost, Agile Iterative Process (AIP), Robot Operating System (ROS), NumPy, Eigen
**Computer Languages:** Python, C++, MATLAB

## PUBLICATIONS

- Self balancing robot using complementary filter: Implementation and analysis of complementary filter on SBR : Kartik Madhira, Ammar Gandhi and Aneesha Gujral, 2016 International Conference on Electrical, Electronics, and Optimization Techniques (ICEEOT), Chennai, 2016, pp. 2950-2954.