

# KARTIK MADHIRA

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## EXPERIENCE

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**Software Engineer, Computer Vision**, Innovasea Systems, Boston *Jan 2021 - Present*

- Designing and implementing underwater perception (stereo) solution for accurate biomass estimation of fish.
- Worked on improving air and underwater camera calibration of stereo cameras.

**Software Engineer, Computer Vision**, Vecna Robotics, Boston *Aug 2020 - Dec 2020*

- Implemented perception pipeline prototype for robustly detecting pose of payloads from a forklift robot equipped with a lidar and a camera.
- Implemented detection model experiments tracker and increased detection mAP by 17%.

**Research Assistant**, RAAS Lab, University of Maryland *Jan 2020 - Aug 2020*

- Implemented end-to-end perception pipeline (Gazebo ROS environment) for UAV based autonomous infrastructure inspection. The sensor module includes a 3D Lidar (VLP-16) and a monocular camera.
- Perception pipeline involves semantic understanding of the environment where the infrastructure is present and catering as the input to the planning pipeline.

**Perception Intern**, Aeva Inc., Mountain View *May 2019 - Aug 2019*

- Implemented object tracking and detection feedback tracker for the perception pipeline.
- Worked on end to end metrics to set benchmarks for tracker and classifier improvements.

## PROJECTS

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### Visual - SLAM

- Fun re-implementation of the ORB-SLAM paper by Raul et al. for monocular camera.
- Mapping and tracking implemented by simplifying some of the methods in the paper. All implemented in C++.

### SnapCut/Rotobrush

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

### Structure from Motion (SfM)

- 3D reconstruction of floor structure from multiple snaps taken from a flying quadrotor. To simplify the textureless problem, AprilTags were used on the floor.

### KF, EKF and UKF sensor fusion of Lidar and Radar data

- Implemented for CV and CTRV process model of the ego-vehicle equipped with Lidar and Radar sensors.
- Implementation done using simulated data.

## EDUCATION

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**Master of Engineering**, Robotics *Aug 2018 - May 2020*  
University of Maryland : 3.96

**Bachelors in Technology**, Instrumentation and Control Engineering *Jul 2013 - Aug 2017*  
Nirma University : 3.8

## SKILLS

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**Computer Vision:** Visual odometry, Object segmentation, Object detection, Visual SLAM, Structure from Motion (SfM), Camera calibration, Image processing, 3D computer vision

**Lidar & Radar:** Point Cloud Processing, Sparse Mapping, Sensor Fusion, Radar based tracking

**Softwares/Libraries:** OpenCV, TensorFlow, PCL, Keras, Boost, Agile Iterative Process (AIP), Robot Operating System (ROS), NumPy, Eigen, TensorRT, g2o

**Computer Languages:** C++, Python, MATLAB

## Recommendations

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- **Srikanth Parupati**, Machine Learning Head, Innovasea Systems
- **Dr. Pratap Tokekar**, Associate Professor at UMD CS