

KARTIK MADHIRA

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EXPERIENCE

Software Engineer - Perception, Vecna Robotics, Boston

Aug 2020 - Present

- Implemented perception pipeline for robustly detecting pose of payloads from a forklift robot equipped with a lidar and a camera.
- Improved detection mAP scores by 9% than existing models and deployed mechanism to train models at scale with metrics logging.

Research Assistant, RAAS Lab, University of Maryland

Sep 2019 - Aug 2020

- Implemented and deployed 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 where the infrastructure is present 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)

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

: 3.96

Bachelors in Technology, Instrumentation and Control Engineering

Jul 2013 - Aug 2017

Nirma University

: 3.8

SKILLS

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, 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

RECOMMENDATIONS

- **Dr. Siddharth Chattpar**, Chief Architect - Advanced Development at Vecna Robotics
- **Dr. Magnus Snorrason**, Computer Vision Specialist at Vecna Robotics
- **Dr. Pratap Tokekar**, Associate Professor at UMD CS