

HARISH KUPPAM

vvk243@nyu.edu | [929-326-8617](tel:929-326-8617) | Brooklyn, NY 11220 | [linkedin.com/in/kuppamh/](https://www.linkedin.com/in/kuppamh/)

EDUCATION

New York University, New York, NY

May '21

Master of Science, Mechatronics and Robotics | GPA: 3.92/4.0

Coursework: *Robot Perception, Mobile Robotics, Sensor-Based Robotics, Robot Mechanics*

Indian Institute of Technology Kharagpur, WB, India

Aug '18

Bachelor of Technology, Aerospace Engineering | GPA: 3.32/4.0

Coursework: *Automatic Control, Dynamics, Image Processing, Algorithms and Data Structures, Machine Learning*

TECHNICAL SKILLS

Programming Languages: C++, Python, Matlab, R

Robotics: Computer Vision, Sensor fusion, ROS, Path planning, SLAM, Deep Learning, Reinforcement Learning, Gazebo

APIs: PyTorch, TensorFlow, OpenCV, Git, Open3D, PCL

PROFESSIONAL EXPERIENCE

Sensing and Localization Engineer | Nokia Bell Labs, Murray Hill, NJ

Sep '20 - Present

- Constructed OmniTag, a cost-effective wearable device to localize a person's position in a known environment.
- Implemented Sensor Fusion of Wi-Fi fingerprinting from access points in the map and an IMU using Conditional Random Fields.
- Created custom feature functions for the CRFs and took advantage of the history of data using the Viterbi Algorithm.
- Executed the whole process in python on an online server in real-time and achieved a mean error of 1.2 meters.

Research Assistant | AI4CE LAB, NYU, NY

Aug '19 - Present

- Integrated iRobot Create2 with Ouster-Lidar and TX2 to perform indoor mapping, localization, and autonomous exploration.
- Improved the LOAM algorithm for SLAM with ROS in C++ to make it compatible with the indoor environment.
- Decreased the computation time of registration process by 10% with the use of concurrency in C++ and multiple cores of TX2.

Deep Learning Engineer | CAIRO Lab, UTM, Kuala Lumpur

Jul '18 - Jan '19

- Devised a reward function to train a UAV to land on a moving platform using the Reinforcement Learning algorithm, DDPG.
- Built the neural network architecture using TensorFlow in python and trained the model on a virtual gazebo simulation.

Computer Vision Intern | Flux Auto, Bengaluru

May '17 - Jul '17

- Detected the side lanes of the road in real-time using Histogram equalization, Edge detection, and Hawkeye view in OpenCV.
 - Utilized pre-trained models to detect obstacles and developed an algorithm to calculate the real distance from the car.
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ACADEMIC PROJECTS

Motion Prediction of surrounding vehicles for autonomous vehicles

Aug '20 - Present

- Modified the Lyft dataset into a matrix of two layers containing the spatial and temporal relations of agents in each frame.
- Trained a network on Pytorch with Convolution, Pooling, and Seq to Seq LSTM layers to get the predictions for 50 future frames.

State Estimation of UAV using VIO techniques

Jan '20 - May '20

- Collected data from IMU and camera mounted on an UAV, flown over a mat of April-Tags whose position in the world is known.
- Measured pose and velocity of the UAV using projective transform and optical flow with FAST edge detection and matching.
- Estimated the state using Extended Kalman Filter where measurement is the visual data and prediction is done using IMU data.
- Extended the work to an unknown environment where the depth is found using a stereo camera and Epipolar geometry.

Wrist and Finger Detection with YOLO

Jan '20 - May '20

- Developed a smartphone-based system for the visually impaired to detect the object pointed by finger and generate apt sound.
- Gathered wrist images and performed data augmentation, which along with COCO was trained on Yolo-tinyv2 on Pytorch.
- Improved training efficiency using Transfer Learning, with addition one class(wrist) to the output Yolo layers.

Trajectory tracking of SCARA manipulator

Aug '19 - Dec '19

- Designed Simulink models to direct the manipulator to the desired trajectory and force using inverse kinematics and controls.
- Tackled various hazardous conditions such as escaping from an obstacle and staying in the joint limits using redundancy.

Livestock monitoring using Computer Vision

Jul '18 - Jan '19

- Labelled and Trained images in Faster-RCNN model using TensorFlow, for the detection of livestock through drone footage.
- Designed a novel algorithm to determine the total count of animals detected in a continuous video.