

Prateek Arora

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Research Interests: SLAM, 3D Mapping, Localization.

EDUCATION

University of Nevada, Reno, NV

PhD in Computer Science and Engineering

Aug 2020 – Present

University of Maryland (UMD), College Park, MD

Master of Engineering in Robotics

Aug 2018 – May 2020

GGSIU University, New Delhi, India

Bachelors in Electrical and Electronics Engineering

Jul 2012 – May 2016

EXPERIENCE

Perception and Robotics group, UMD [*Research Assistant*]

Aug 2018 – Dec 2019

- Designed a hardware sensor and corresponding software compute suite for estimating **Visual Inertial Odometry**, which is compact and light enough to be mounted on nano-sized quadrotor (130 mm).

Indraprastha Institute of Information Technology (IIIT), Delhi, India [*Research Associate*]

Jul 2017 - Jul 2018

- Worked on traffic light detection in Indian traffic environment and system integration of software stack (ROS based) of the **autonomous driving** car at IIIT-D named [Swarath](#).

PUBLICATIONS

- Mobile Manipulation-based Deployment of Micro Aerial Robot Scouts through Constricted Aperture-like Ingress Points: *Prateek Arora, Christos Papachristos*: **IROS 2021** [[Video](#)] [[Best Paper finalist in two categories](#)]
- Environment Reconfiguration Planning for Autonomous Robotic Manipulation to overcome Mobility Constraints: *Prateek Arora, Christos Papachristos*: **ICRA 2021** [[Video](#)]
- Launching a Micro-Scout UAV from a Mobile Robotic Manipulator Arm: *Prateek Arora, Christos Papachristos*: **AeroConf 2021** [[Paper](#)]
- Mobile Manipulator Robot Visual Servoing and Guidance for Dynamic Target Grasping: *Prateek Arora, Christos Papachristos*: **ISVC 2020** [[Paper](#)] [[Video](#)]

RELEVANT COURSE PROJECTS

Computer Vision and Deep Learning

- **Camera Calibration:** Implemented camera calibration pipeline (based on the work of Zhang et al.) to obtain intrinsic camera parameters and estimating radial camera distortion.
- **Deep Homography Net, Supervised and Unsupervised:** Implemented deep CNN to estimate homography between two images using TensorFlow.
- **Structure from Motion (or SLAM):** Reconstructed 3D scene and simultaneously computed camera pose using multiple views from a single camera.
- **SFM using Deep learning:** Improved accuracy of an unsupervised learning framework for monocular structure from motion (paper: [SFM Learner](#))
- **Gaussian Mixture Model (GMM):** Implemented *GMM* to detect colored windows in real time on an onboard resource constrained microprocessor board to allow autonomous navigation of a drone through it.

State and Pose Estimation

- **Pose estimation:** 3D pose estimation of Custom fiducial marker in real-time in order to land a quadrotor on it.
- **Attitude Estimation:** Implemented *Madgwick* and *Unscented Kalman Filter* to estimate orientation of a 6-DoF IMU.
- **Stereo Visual Odometry:** Estimated 3D trajectory of a quadrotor equipped with a stereo camera using optical flow.

Mobile Base Manipulator Arm

- **Structural inspection planner:** This work considers the problem of finding a feasible path that respects the constraints of mobile manipulator system to provide complete coverage of a 3D structure and reconstruct it using a stereo camera.

SKILLS

Computer Languages: Python, C++, Matlab

Operating System: Linux, Windows

Softwares/Libraries: ROS, Gazebo, Tensorflow, PyTorch, Git, Jupyter, Eagle, Inventor